PB86-183308

Environmental Assessment of a Watertube Boiler Firing a Coal-Water Slurry. Volume 2. Data Supplement

Acurex Corp., Mountain View, CA

Prepared for

Environmental Protection Agency
Research, Triangle Park, NC

Feb 86

U.S. Department of Commerce
National Technical Information Service
NTIS

PB 86-183308

EPA/600/7-86/004b
February 1986

ENVIRONMENTAL ASSESSMENT OF A WATERTUBE BOILER FIRING A COAL-WATER SLURRY

Volume II
Data Supplement

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EPA Contract No. 68-02-3188

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NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.
EPA/600/7-86/004b

2.

3. RECIPIENT'S ACCESSION NO.
PB86 183308 /AS

4. TITLE AND SUBTITLE
Environmental Assessment of a Watertube Boiler Firing a Coal/Water Slurry; Volume II. Data Supplement

5. REPORT DATE
February 1986

6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)
R. DeRosier and L.R. Waterland

8. PERFORMING ORGANIZATION REPORT NO.

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Acurex Corporation
P.O. Box 7555
Mountain View, California 94039

10. PROGRAM ELEMENT NO.

11. CONTRACT/GRANT NO.
68-02-3188

12. SPONSORING AGENCY NAME AND ADDRESS
EPA, Office of Research and Development
Air and Energy Engineering Research Laboratory
Research Triangle Park, NC 27711

13. TYPE OF REPORT AND PERIOD COVERED
Final; 1/84 - 3/85

14. SPONSORING AGENCY CODE
EPA/600/13

15. SUPPLEMENTARY NOTES AEERL project officer is Robert E. Hall, Mail Drop 65, 919/541-2477. Volume I gives technical results of the work.

16. ABSTRACT The report is a compendium of detailed test sampling and analysis data obtained in field tests of a watertube industrial boiler burning a coal/water slurry (CWS). Test data included in the report include preliminary stack test data, boiler operating data, and complete flue gas emission results. Flue gas emission measurements included continuous monitoring for criteria pollutants; onsite gas chromatography (GC) for volatile hydrocarbons (C1-C6); Methods 5/8 sampling for particulate, SO2, and SO3 emissions; source assessment sampling system (SASS) for total organics in two boiling point ranges (100 to 300 C and > 300 C), organic compound category information using infrared spectrometry (IR), liquid column (LC) chromatography separation, and low resolution mass spectrometry (LRMS), specific quantitation of the semivolatile organic priority pollutants using gas chromatography/mass spectrometry (GC/MS), and trace element emissions using spark source mass spectrometry (SSMS) and atomic absorption spectroscopy (AAS); N2O emissions by gas chromatography electron capture detector (GC/ECD); and biological assay testing of SASS and ash stream samples.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution	Pollution Control	13B
Water Tube Boilers	Stationary Sources	13A
Slurries	Test Data	11G
Coal	Industrial Boilers	08G, 21D
Sampling	Analyzing	14B

18. DISTRIBUTION STATEMENT
Release to Public

19. SECURITY CLASS *(This Report)*
Unclassified

20. SECURITY CLASS *(This page)*
Unclassified

21. NO. OF PAGES
295

22. PRICE

EPA Form 2220-1 (9-73)

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SECTION 1

INTRODUCTION

The purpose of this data supplement is to document data in greater detail than was possible in Volume I (Technical Results) of this report. It is intended to provide sufficient detail for researchers to perform their own analysis of the data obtained. Readers are referred to the technical volume for objectives, description of source emission results, data interpretation, and conclusions.

The remaining sections of this data supplement contain the following information:

Section 2 -- Preliminary Tests: stack velocity traverse and gas composition tests

Section 3 -- Boiler Operating Data: continuous monitors, pressures, temperatures, and flowrates

Section 4 -- Sampling Data Sheets: operating data tables for EPA Method 5/8 (for particulate mass emissions, SO_2 and SO_3 sampling), and SASS (for trace element and organic sampling)

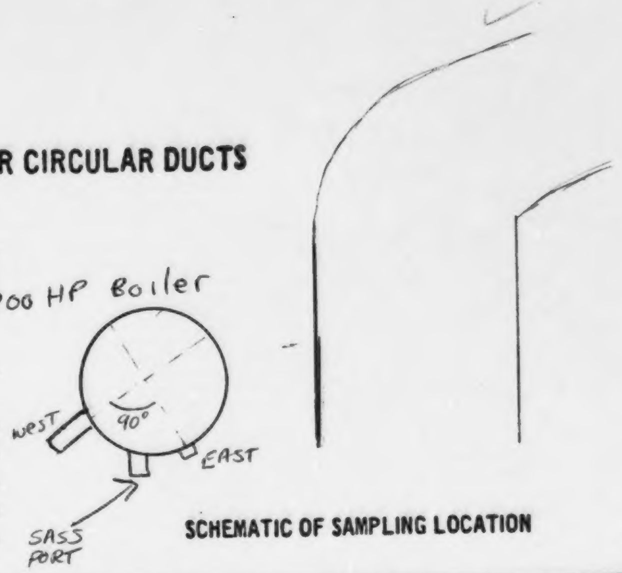
Section 5 -- Analytical Laboratory Results: fuel analysis, SASS particulate emissions; Method 5 particulate emissions; Method 8 sulfur oxides emissions; trace element emissions by spark source mass spectrometry (SSMS) and atomic absorption spectroscopy (AAS); C_1 to C_6 hydrocarbons by gas chromatography; N_2O by gas chromatography; total chromatographable organic (TCO) and gravimetric (GRAV) results; infrared (IR) spectra; determination of organic compounds by gas chromotography/mass spectrometry (GC/MS); liquid chromatography (LC) separation results; low resolution mass spectrometry (LRMS) analyses; and biological assay reports.

SECTION 2

PRELIMINARY RESULTS

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT PETC / DOE
DATE 6-11-82
SAMPLING LOCATION INLET TO BAGHOUSE, 700 HP Boiler
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 35"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 11"
STACK I.D., (DISTANCE A - DISTANCE B) 24"
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR Murtiff



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
6	.956	24"	~~12~~ 23"	11"	34"
5	.854	24"	20.5"		31.5"
4	.704	24"	16.9"		27.9"
3	.296	24"	7.1"		18.1"
2	.146	24"	35"		14.5"
1	.044	24"	1"		12"
6	.956	24"	23"	3"	26"
5	.854	24"	20.5"		23.5"
4	.704	24"	16.9"		19.9"
3	.296	24"	7.1"		10.1"
2	.146	24"	3.5"		6.5"
1	.044	24"	1"		4"

EPA (Dur) 232
4/72

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PRELIMINARY VELOCITY TRAVERSE

PLANT PETC /DOE
DATE 6-11-82
LOCATION INLET TO BAGHOUSE, 700 H.P Boiler
STACK I.D. 24"
BAROMETRIC PRESSURE, in. Hg 29.13
STACK GAUGE PRESSURE, in. H_2O -2.5" H2O
OPERATORS JOE PETC Personnell

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	0.75	531°F
2	0.50	
3	0.52	
4	0.65	
6	0.75	
7	0.70	
8	0.65	
9	0.47	
AVERAGE	0.63	

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

ISOKINECTIC SAMPLING WORKSHEET

Plant PETC /DOE Peformed by Murtiff
Date 6/11/82
Sample Location Coal water mixture / Inlet to Baghouse, 700 HP Boiler
Test No./Type M/5/8

$$K = \frac{782.687\ (Cp)^2\ (1-B_{wo})^2\ P_s\ M_d}{K_o^2\ M_s\ P_m}$$

where: K = Contant of fixed and assumed parameters (dimensionless)

Pitot coefficient (dimensionless)	C_p	0.789
Water vapor in the gas stream (proportion by volume)	B_{wo}	Assume 0.09
Absolute stack gas pressure (in. Hg)	P_s	−2.5" H2O 28.95
Molecular weight, stack gas dry (lb/lb-mole)	M_d 30.36	Assume CO2 14% O2 3% N2 83%
Orifice coefficient (dimensionless)	K_o	0.711
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	29.25
Abolute meter pressure (in. Hg)	P_m	29.13
$\frac{782.687\ (0.789)^2\ (1-.09)^2\ (28.95)\ (30.36)}{(0.711)^2\ (29.25)\ (29.13)}$	K	823.32

ISOKINECTIC NOZZLE CALCULATION
AND
SAMPLING RATE CALCULATION

Plant DOE / PETC   Performed by Murtiff

Date 6/11/82

Sample Location Baghouse Inlet; 700 HP Boiler

Test No./Type M 5/8

$$N_d = \left(\frac{\Delta H \, T_s}{K \, T_m \, \Delta P}\right)^{.25}$$

where: N_d = Nozzel diameter (inches)

Average pressure differential across the orifice meter (in. H_2O)	ΔH	1.8
Temperature stack gas, average (°F)	T_s	530
Temperature of gas meter, average (°F)	T_m	80
Stack gas velocity pressure (in H_2O)	ΔP	0.62
$\left(\frac{(1.8)\ (530 + 460)}{(823.32)\ (80 + 460)(0.62)}\right)^{.25}$	N_d	0.284

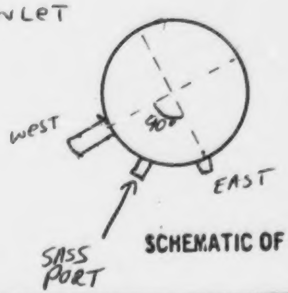
$$\Delta H = K\,(N_d)^4\,\frac{T_m}{T_s}\,(\Delta P)$$

where: ΔH = Pressure differential across the orifice meter (in H_2O)

Nozzel diameter, actual (inches)	N_d	0.252
Temperature of gas meter (°F)	T_m	80 ~~530~~
Temperature of stack gas (°F)	T_s	530 ~~80~~
Stack gas velocity pressure (in H_2O)	ΔP	0.62
$\left((823.32)\ (0.252)^4\ \frac{(80 + 460)}{(530 + 460)}\ (0.62)\right)$	ΔH	1.12
Magic number 823.32 $(.252)^4$	$K(N_d)^4$	3.32

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT PETC /DOE
DATE 6/17/82
SAMPLING LOCATION 700 HP Boiler, BAGHOUSE INLET
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 35"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 11"
STACK I.D., (DISTANCE A - DISTANCE B) 24"
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR Murtiff



SCHEMATIC OF SAMPLING LOCATION

	TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
WEST	6	0.956	24"	23"	11"	34"
	5	0.854		20.5"		31.5
	4	0.704		16.9"		27.9
	3	0.296		7.1"		18.1
	2	0.146		3.5"		14.5
	1	0.044		1"		12
EAST	6	0.956		23"	3"	26
	5	0.854		20.5"		23.5
	4	0.704		16.9"		19.9
	3	0.296		7.1"		10.1
	2	0.146		3.5"		6.5
	1	0.044		1"		4"

PRELIMINARY VELOCITY TRAVERSE

PLANT PETC /DOE
DATE 6/17/82
LOCATION 700 HP Boiler, Baghouse Inlet
STACK I.D. 24"
BAROMETRIC PRESSURE, in. Hg 28.92
STACK GAUGE PRESSURE, in. H_2O -3.0" H2O
OPERATORS Murtiff from Joe Jope
PETC Personnel J. Thomas.

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	0.37	525°F
2	0.43	↓
3	6.55	
4	0.67	
6	0.70	
7	0.70	
8	0.70	
9	0.53	
AVERAGE	0.58	525°F

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4 72

ISOKINECTIC SAMPLING WORKSHEET

Plant PETC /DOE Peformed by Mustiff

Date 6/17/82

Sample Location 700 H.P. Boiler, Bag house Inlet

Test No./Type 2 m 5/8

$$K = \frac{782.687\ (Cp)^2\ (1-B_{wo})^2\ P_s\ M_d}{K_o^2\ M_s\ P_m}$$

where: K = Contant of fixed and assumed parameters (dimensionless)

Pitot coefficient (dimensionless)	C_p	0.789
Water vapor in the gas stream (proportion by volume)	B_{wo}	0.09 Assumed
Absolute stack gas pressure (in. Hg)	- 3.0" H_2O P_s	28.70
Molecular weight, stack gas dry (lb/lb-mole)	M_d Assume 14 % CO_2 3 % O_2 83 % N_2	30.36
Orifice coefficient (dimensionless)	K_o	0.711
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	29.25
Abolute meter pressure (in. Hg)	P_m	28.92
$\frac{782.687\ (0.784)^2\ (1-.09)^2\ (28.70)\ (30.36)}{(0.711)^2\ (29.25)\ (28.92)}$	K	822.14

ISOKINECTIC NOZZLE CALCULATION
AND
SAMPLING RATE CALCULATION

Plant PETC /DOE **Performed by** Mustiff
Date 6/17/82
Sample Location 700 HP Boiler, Baghouse Inlet
Test No./Type 2 / m 5/8

$$N_d = \left(\frac{\Delta H\ T_s}{K\ T_m\ \Delta P} \right)^{.25}$$

where: N_d = Nozzel diameter (inches)

Average pressure differential across the orifice meter (in. H_2O)	ΔH	1.7
Temperature stack gas, average (^{o}F)	T_s	530
Temperature of gas meter, average (^{o}F)	T_m	80
Stack gas velocity pressure (in H_2O)	ΔP	0.58
$\left(\frac{(1.7)\ (530 + 460)}{(822.14)\ (80 + 460)(0.58)} \right)^{.25}$	N_d	0.284

$$\Delta H = K\ (N_d)^4\ \frac{T_m}{T_s}\ (\Delta P)$$

where: ΔH = Pressure differential across the orifice meter (in H_2O)

Nozzel diameter, actual (inches)	N_d	0.252
Temperature of gas meter (^{o}F)	T_m	80 ~~530~~
Temperature of stack gas (^{o}F)	T_s	530 ~~80~~
Stack gas velocity pressure (in H_2O)	ΔP	0.58
$\left((822.14)\ (.252)^4\ \frac{(80 + 460)}{(530 + 460)}\ (0.58) \right)$	ΔH	1.05
Magic number _______( )^4	$K(N_d)^4$	3.315

SECTION 3

BOILER OPERATING DATA

Key to Operating Data Tables

Column No.	Parameter measured
6	CO_2 volume fraction in dry flue gas after furnace (percent)
7	O_2 volume fraction in dry flue gas after furnace (percent)
8	Taylor O_2 analyzer after furnace (percent)
9	CO volume fraction in dry flue gas after furnace (ppm)
10	CH_X volume fraction in dry flue gas after furnace (ppm)
11	NO_X volume fraction in dry flue gas after furnace (ppm)
12	SO_X volume fraction in dry flue gas after furnace (ppm)
13	CO_2 volume fraction in dry flue gas after baghouse (percent)
14	O_2 volume fraction in dry flue gas after baghouse (percent)
15	CO volume fraction in dry flue gas after baghouse (ppm)
16	CH_X volume fraction in dry flue gas after baghouse (ppm)
17	NO_X volume fraction in dry flue gas after baghouse (ppm)
19	Mass flowrate of fuel from micromotion meter (lb/min)
22	Barometric pressure (psia)
23	Furnace pressure (in. H_2O)
24	Pressure of steam in boiler (psia)
25	Pressure of fuel before preheater (psia)
29	Pressure of atomizing steam to burner (psia)
30	Pressure of CWS loop at pipe bend (psia)
31	Pressure drop of CWS loop across bend (in H_2O)
32	Pressure of CWS loop after straight section (psia)
33	Pressure of CWS loop at end of test section (psia)
34	Combustion air pressure at brandt meter (in. H_2O)
35	Coal/water pressure at nozzle (psia)
36	Coal/water pressure at pump (psia)
37	Atomizing air pressure at orifice (psia)
38	Atomizing air pressure at nozzle (psia)
39	Natural gas pressure (psia)
40	Center tube pressure (in. H_2O)
41	Scani zero reference (approximately 3 psig) (psig)
42	Scani span reference (approximately 9 psig) (psig)
43	Pressure drop of atomizing steam (in. H_2O)
44	Pressure drop of steam from boiler (in. H_2O)
45	Pressure drop of makeup water at orifice (in. H_2O)
46	Pressure drop of combustion air (annubar) (in. H_2O)
47	Pressure drop of CWS across straight section (in. H_2O)
48	Pressure drop of CWS across the test section (in. H_2O)
49	Atomizing air flow (in. H_2O)
50	Natural gas flowrate (in. H_2O)
51	Center tube delta P (in. H_2O)
52	Combustion air flow (brandt total air) (in. H_2O)
53	Temperature of flue gas after cooler (°F)
54	Temperature at flue gas cooler (°F)
55	Temperature at fuel after preheater (°F)
56	Temperature at bottom of coal supply hopper (°F)
57	Temperature of dust collector (°F)
58	Temperature at bottom of proportioning feeder tank (°F)

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Key to Operating Data Tables (concluded)

Column No.	Parameter measured
59	Temperature at bottom of coal slurry hold tank (°F)
60	Temperature of fuel oil at storage tank (1 ft from bottom) (°F)
61	Temperature of fuel oil at storage tank (6 ft from bottom) (°F)
62	Temperature of fuel oil at storage tank (12 ft from bottom) (°F)
63	Temperature of fuel oil at storage tank (18 ft from bottom) (°F)
64	Temperature of fuel oil at storage tank outlet (°F)
65	Temperature of fuel before preheater (°F)
66	Temperature of fuel to burner (°F)
67	Temperature at baghouse no. 1 (°F)
68	Temperature at stack blower inlet (°F)
69	Temperature at stack blower outlet (°F)
70	Temperature of combustion air to furnace (°F)
71	Temperature of flue gas after cooler (°F)
72	Temperature of atomizing steam (°F)
74	Temperature of steam from boiler (°F)
75	Coal/water temperature at nozzle (°F)
76	Boiler skin temperature (front west) (°F)
77	Boiler skin temperature (top center east) (°F)
78	Boiler skin temperature (top center west) (°F)
79	Atomizing air temperature at orifice (°F)
80	Entrance of convection bank temperature (°F)
81	Boiler skin temperature (right side east rear) (°F)
82	Natural gas temperature (°F)
83	Water outlet temperature (°F)
84	Boiler skin temperature (left side west front) (°F)
85	Combustion air temperature at brandt meter (°F)
86	North wall temperature (°F)
87	Temperature of flue gas after furnace (°F)
88	Temperature at makeup water orifice (°F)
89	Temperature of duct exit of boiler (°F)
90	Temperature of condensate return line at D A (°F)
91	Temperature of CWS loop after pump (°F)
92	Temperature of CWS loop at pipe bend (°F)
93	Temperature of CWS loop at test section inlet (°F)
94	Temperature of CWS loop at end of test section (°F)
95	Center tube air temperature (°F)
96	Refractory temperature taper block (°F)
97	Refractory temperature top of convulsion (°F)
98	Refractory temperature bottom of convulsion (°F)
99	Thermocouple reference junction temperature (°F)

6/11/82

TIME	6	7	8	9	10	11	12	13	14	15	16	17
9.30-9.45	14.7	2.34	15.8	203	0.821	198	–	14.7	2.84	203	0.821	198
9.45-10.00	14.9	2.74	15.1	205	0.730	196	–	14.9	2.74	205	0.730	196
10.00 - 10.15	14.9	2.72	14.5	209	0.593	197	** –	14.9	2.72	209	0.593	197
10.15 - 10.30	15.0	2.74	13.9	204	0.417	215	** –	15.0	2.74	204	0.417	215
10.30 - 10.45	15.0	2.75	13.3	203	0.215	228	* 904	15.0	2.75	203	0.215	228
10.45 - 11.00	15.1	2.75	12.6	205	0.112	220	* –	15.1	2.75	205	0.104	220
11.00 - 11.15	15.2	2.65	12.0	213	0.147	211	910	15.2	2.65	213	0.137	211
11.15 - 11.30	15.1	2.83	11.3	193	0.0977	215	890	15.1	2.83	193	0.0521	215
11.30 - 11.45	15.1	2.88	10.8	191	0.0326	214	917	15.1	2.88	191	0.00652	214
11.45 - 12.00	15.2	* 2.86	* 10.2	* 142	* –	* 215	* 821	9.38	1.77	142	–0.528	13.0
12.00 - 12.15	* 0.0665	* 0.0855	* 9.77	* 56.7	* –	* 266	* 453	1.17	3.21	279	0.319	279
12.15 - 12.30	* 0.0785	* 2.92	* 9.41	* 499	* 2.43	* 248	* 324	11.6	2.92	449	2.57	248
12.30 - 12.45	14.6	2.80	9.24	138	2.06	228	987	14.6	2.80	138	2.06	228
12.45 - 13.00	14.6	2.82	9.09	136	1.86	226	998	14.6	2.82	136	1.86	226
13.00 - 13.15	14.7	2.81	8.97	139	1.73	248	1034	14.7	2.81	139	1.73	248
13.15 - 13.30	14.7	2.86	8.87	140	1.70	274	1060	14.7	2.86	140	1.84	274
13.30 - 13.45	14.8	2.73	8.79	142	2.51	285	1071	14.8	2.73	142	2.51	285
13.45 - 14.00	14.7	2.90	8.73	130	2.46	293	* 1006	14.7	2.90	130	2.46	293
14.00 - 14.80	14.7	2.85	8.63	130	2.61	292	846	14.7	2.85	130	2.61	292
TOTAL	253	44.17	181.6	2781	18.1	3740	8713	259.9	52.57	365.1	20.51	4397
AVERAGE	14.9	2.76	11.3	174	1.13	234	968	13.7	2.77	192.	1.08	231
UNITS	%	%	%	PPM	PPM	PPM	PPM	%	%	PPM	PPM	PPM

* not reliable calibrating } not included in averaging

** SO_2 bad

✓

6/11/82

TIME	19	22	23	24	25	29	30	31	32	33	34	35
9.30 - 9.45	52.3	14.3	0.371	190	208	190	52.3	4.57	-110	-110	8.56	118
9.45 - 10.00	52.3	14.3	0.462	190	207	190	52.3	4.53	-111	-111	8.63	118
10.00 - 10.15	52.2	14.3	0.477	190	208	190	52.2	4.53	-110	-111	8.69	118
10.15 - 10.30	52.2	14.3	0.471	190	209	190	52.2	4.56	-110	-111	8.69	118
10.30 - 10.45	52.1	14.3	0.476	190	210	190	52.1	4.31	-110	-111	8.73	118
10.45 - 11.00	52.0	14.3	0.469	191	211	191	52.0	4.18	-111	-111	8.71	118
11.00 - 11.15	52.1	14.3	0.484	190	214	190	52.1	4.23	-110	-111	8.81	117
11.15 - 11.30	52.1	14.3	0.511	190	214	190	52.1	4.27	-111	-111	8.96	118
11.30 - 11.45	52.0	14.3	0.468	188	216	188	52.0	4.50	-111	-111	8.99	118
11.45 - 12.00	52.0	14.3	0.438	188	220	188	520	4.64	-111	-111	8.99	118
12.00 - 12.15	51.9	14.3	0.461	188	225	188	51.9	4.67	-111	-111	9.05	118
12.15 - 12.30	51.5	14.3	0.422	188	228	188	51.5	4.63	-111	-111	9.27	120
12.30 - 12.45	51.3	14.3	0.469	188	228	188	51.3	4.60	-111	-111	9.02	122
12.45 - 13.00	51.4	14.3	0.494	188	227	188	51.4	4.57	-111	-110	9.03	121
13.00 - 13.15	51.2	14.3	0.464	188	228	188	51.2	4.58	-111	-111	8.81	121
13.15 - 13.30	51.3	14.3	0.491	188	229	188	51.3	4.43	-111	-111	8.87	127
13.30 - 13.45	51.6	14.3	0.472	188	230	188	51.6	4.47	-111	-111	8.87	127
13.45 - 14.00	51.6	14.3	0.488	188	232	188	51.6	4.46	-110	-110	9.23	126
14.00 - 14.80	51.4	14.3	0.476	188	234	188	51.4	4.43	-110	-111	9.23	125
TOTAL	984.5	271.70	8.864	3589	4178	3589	984.5	85.16	-2102	-2106	166.14	2286
AVERAGE	51.8	14.3	0.466	189	220	189	51.8	4.48	-111	-111	8.74	120
UNITS	LB/MIN	PSIA	IN. H2O	PSIA	PSIA	PSIA	PSIA	IN. H2O	PSIA	PSIA	IN. H2O	PSIA

6/11/82

TIME	36	37	38	39	40	41	42	43	44	45	46	47
9.30- 9.45	138	116	101	24.8	8.56	3.03	9.04	0.696	94.6	64.4	0.438	105
9.45 - 10.00	137	117	101	24.7	8.63	3.03	9.04	0.660	94.9	62.8	0.428	105
10.00 - 10.15	138	117	101	24.7	8.69	3.03	9.03	0.538	95.1	61.9	0.427	107
10.15 - 10.30	138	117	101	24.7	8.69	3.03	9.03	0.464	95.3	62.2	0.429	108
10.30 - 10.45	138	117	101	24.7	8.73	3.02	9.04	0.623	94.9	68.1	0.426	130
10.45 - 11.00	137	117	101	24.7	8.71	3.01	9.03	0.366	94.7	62.0	0.423	134
11.00 - 11.15	137	116	100	24.7	8.81	3.01	9.02	0.354	95.5	62.6	0.427	132
11.15 - 11.30	138	117	101	24.6	8.96	3.01	9.04	0.586	97.3	63.5	0.446	133
11.30 - 11.45	139	116	101	24.7	8.99	3.02	9.02	0.635	97.1	63.9	0.450	138
11.45 - 12.00	138	116	101	24.7	8.99	3.02	9.03	0.501	96.6	62.6	0.448	135
12.00 - 12.15	138	116	101	24.7	9.05	3.02	9.05	0.562	96.2	62.5	0.448	140
12.15 - 12.30	138	116	101	24.7	9.27	3.02	9.03	0.574	94.9	61.7	0.422	122
12.30 - 12.45	139	116	100	24.6	9.02	3.01	9.04	0.599	94.1	61.3	0.414	128
12.45 - 13.00	138	115	100	24.6	9.03	3.02	9.03	0.538	94.2	61.5	0.422	131
13.00 - 13.15	138	115	100	24.6	8.81	3.02	9.04	0.586	93.7	61.3	0.427	134
13.15 - 13.30	144	116	100	24.6	8.87	3.02	9.03	0.855	93.8	61.1	0.428	131
13.30 - 13.45	144	115	100	24.6	8.87	3.02	9.04	0.831	94.3	61.4	0.433	132
13.45 - 14.00	142	116	100	24.7	9.23	3.02	9.04	1.11	94.9	61.4	0.437	131
14.00 - 14.80	140	115	100	24.6	9.23	3.02	9.04	0.325	94.9	61.8	0.425	133
TOTAL	2639	2206	1911	468.7	169.14	57.38	171.66	11.42	1807	1182	8.22	2409
AVERAGE	139	116	100	24.7	8.90	3.02	9.03	0.60	96.1	62.2	0.43	127
UNITS	PSIA	PSIA	PSIA	PSIA	IN H2O	PSIG	PSIG	IN H2O	IN H2O	IN H2O	IN H2O	IN H2O

6/11/83

TIME	48	49	50	51	52	53	54	55	56	57	58	59
9.30 - 9.45	-37.5	19.2	-0.022	1.36	0.681	380	413	-97.3	2678	22091	88.6	116
9.45 - 10.00	-37.5	19.3	-0.039	1.34	0.674	383	419	-97.6	2787	22651	87.9	119
10.00 - 10.15	-37.5	19.2	-0.041	1.36	0.671	384	420	-97.3	2909	23122	87.3	117
10.15 - 10.30	-37.5	19.1	-0.019	1.33	0.672	385	421	-97.3	2973	23608	86.8	118
10.30 - 10.45	-37.5	19.2	-0.044	1.33	0.669	385	422	-97.4	3006	24091	86.8	118
10.45 - 11.00	-37.4	19.3	-0.044	1.32	0.665	387	423	-97.2	3073	24465	86.8	117
11.00 - 11.15	-37.5	19.2	-0.049	1.32	0.661	387	424	-97.3	3095	24801	86.8	117
11.15 - 11.30	-37.5	19.3	-0.046	1.36	0.684	391	427	-97.4	3141	25127	87.2	118
11.30 - 11.45	-37.5	19.2	-0.054	1.36	0.687	391	428	-97.2	3218	25485	86.3	118
11.45 - 12.00	-37.5	19.3	-0.054	1.36	0.683	393	430	-97.4	3309	25722	86.9	118
12.00 - 12.15	-37.5	19.2	-0.054	1.36	0.683	395	431	-97.6	3379	26074	86.5	119
12.15 - 12.30	-37.5	19.2	-0.061	1.32	0.665	394	432	-97.3	3169	26633	86.3	118
12.30 - 12.45	-37.5	19.3	-0.061	1.31	0.652	393	430	-97.4	6188	26458	86.4	118
12.45 - 13.00	-37.5	19.2	-0.068	1.31	0.656	393	432	-97.4	2258	23297	86.2	119
13.00 - 13.15	-37.5	19.3	-0.032	1.30	0.657	396	433	-97.2	267	21788	86.2	118
13.15 - 13.30	-37.5	19.3	-0.032	1.31	0.659	398	435	-97.3	-554	21460	86.1	119
13.30 - 13.45	-37.5	19.2	-0.044	1.32	0.666	398	435	-97.2	-587	21347	85.9	118
13.45 - 14.00	-37.4	19.2	-0.029	1.36	0.687	400	438	-97.6	-283	21373	86.4	119
14.00 - 14.30	-37.5	19.1	-0.022	1.36	0.678	402	440	-97.2	9.69	21154	86.2	117
TOTAL	-712.3	365.3	-0.79	25.39	12.76	7435	8133	-1849.6	44035.7	450,747	1647.6	2241
AVERAGE	-37.5	19.2	-0.04	1.34	0.67	391	.428	-97.3	2317.7	23723	86.7	118
UNITS	IN H20	IN. H20	IN H20	IN H20	IN H20	F	F	F	F	F	F	F

6/11/82

TIME	60	61	62	63	64	65	66	67	68	69	70	71
9.30 - 9.45	155	122	133	132	200	-475	79.4	333	350	352	78.2	370
9.45 - 10.0	156	122	134	133	201	618	79.0	338	355	357	79.3	373
10.0 - 10.15	154	121	134	132	205	-371	78.4	338	355	361	79.5	373
10.15 - 10.30	155	121	134	134	206	1745	77.9	338	358	363	79.1	376
10.30 - 10.45	154	121	133	132	208	-227	78.2	338	360	364	79.0	379
10.45 - 11.00	152	121	132	131	208	2161	78.2	340	361	364	79.4	381
11.0 - 11.15	152	121	133	131	208	4406	78.2	342	363	366	80.5	381
11.15 - 11.30	150	121	132	132	210	5722	78.5	346	364	369	82.8	382
11.30 - 11.45	149	121	133	132	211	1486	78.6	346	365	372	82.6	381
11.45 - 12.00	149	122	134	132	213	2155	78.5	347	370	372	84.3	382
12.00 - 12.15	149	121	135	134	215	560	80.7	346	371	372	81.9	385
12.15 - 12.30	148	121	137	135	216	2586	82.0	346	371	373	83.7	385
12.30 - 12.45	147	122	135	135	216	-471	81.8	347	369	372	86.1	381
12.45 - 13.00	147	123	136	135	216	576	80.7	347	370	372	85.9	385
13.00 - 13.15	147	122	137	136	216	8610	81.3	347	370	372	86.5	387
13.15 - 13.30	147	125	138	137	216	1360	82.1	348	371	371	85.6	388
13.30 - 13.45	147	126	137	137	216	2075	82.7	351	371	372	85.3	389
13.45 - 14.00	147	125	138	137	216	1820	82.4	353	372	374	87.0	393
14.00 - 14.8	147	126	137	136	216	488	81.9	355	372	373	86.7	391
TOTAL	2852	2324	2562	2543	4013	34824	1757.1	6546	6938	6991	1574	7262
AVERAGE	150	122	135	134	211	1833	92.5	344	365	368	82.8	382
UNITS	F	F	F	F	F	F	F	F	F	F	F	F

6/11/82

TIME	72	74	75	76	77	78	79	80	81	'82	83	84
9.30-9.45	165	371	114	193	408	127	126	1594	120	72.5	851	122
9.45-10.0	165	372	115	196	414	129	130	1587	121	76.7	865	121
10.0-10.15	164	372	115	204	422	97.5	130	1560	122	84.0	857	344
10.15-10.30	164	372	116	198	416	130	130	1584	121	77.8	832	121
10.30-10.45	164	372	118	199	416	127	128	1582	121	78.2	863	122
10.45-11.00	165	372	115	199	417	129	131	1590	121	78.2	865	122
11.00-11.15	165	372	116	200	418	129	137	1593	122	78.5	863	122
11.15-11.30	165	371	115	202	414	130	134	1593	122	78.5	863	123
11.30-11.45	165	370	115	204	412	129	130	1590	122	78.7	863	125
11.45-12.00	166	370	118	207	413	130	130	1583	123	81.4	864	125
12.00-12.15	165	370	117	207	412	130	130	1580	126	82.4	863	127
12.15-12.30	162	371	118	204	418	113	180	1578	125	80.0	865	125
12.30-12.45	155	371	116	202	424	109	132	1580	123	77.7	867	122
12.45-13.00	150	371	116	203	418	102	131	1601	122	77.8	864	122
13.00-13.15	147	371	116	200	413	106	129	1611	122	77.8	865	137
13.15-13.30	140	370	116	202	411	102	132	1587	120	77.2	861	127
13.30-13.45	137	371	117	205	407	98.6	128	1580	121	78.7	866	134
13.45-14.00	180	371	118	205	415	98.2	130	1570	121	81.2	854	121
14.00-14.80	130	371	116	204	422	97.5	180	1560	122	84.0	857	344
TOTAL	2964	7051	2207	3829	7884	2248.3	2482	30129	2317	1496	16337	2584
AVERAGE	156	371	116	202	415	118	131	1586	122	78.7	860	136
UNITS	F	F	F	F	F	F	F	F	F	F	F	F

6/11/82

TIME	85	86	87	88	89	90	91	92	93	94	95	96
9.30 -9.45	489	1748	527	218	531	221	101	98.1	102	893	408	893
9.45 -10.00	494	1874	528	217	533	226	103	100	104	899	414	899
10.00 - 10.15	498	2885	528	216	535	226	104	100	104	904	416	904
10.15 - 10.30	501	2954	532	216	535	229	104	103	106	911	416	911
10.30 - 10.45	501	768	533	217	536	227	104	104	104	914	416	914
10.45 - 11.00	501	688	535	217	588	228	104	104	104	920	417	920
11.00 - 11.15	500	782	536	219	540	231	104	104	104	923	418	923
11.15 - 11.30	493	874	540	220	544	229	104	103	104	929	414	929
11.30 - 11.45	493	1055	542	217	544	221	104	104	104	935	412	935
11.45 - 12.00	494	1186	543	217	548	222	104	104	105	938	413	938
12.00 - 12.15	493	1883	544	216	549	222	106	104	105	944	412	944
12.15 - 12.30	501	2101	543	216	548	220	109	104	108	946	418	946
12.30 - 12.45	507	1532	543	216	547	221	107	103	104	951	424	951
12.45 - 13.00	499	1465	543	216	551	221	104	103	103	955	418	955
13.00 - 13.15	495	1465	545	216	551	223	104	108	102	961	413	961
18.15 - 13.30	492	1466	547	216	552	220	103	103	103	965	411	965
13.30 - 13.45	488	2301	550	216	552	222	103	102	103	970	407	970
13.45 - 14.00	496	3034	552	216	555	224	103	100	102	972	415	971
14.00 - 14.80	505	1643	553	216	555	222	102	98.1	101	973	422	973
TOTAL	9440	31694	10564	4118	10344	4255	1977	1944.2	1975	17803	7884	17802
AVERAGE	497	1668	556	217	544	224	104	102.3	104	937	415	937
UNITS	F	F	F	F	F	F	F	F	F	F	F	F

6/11/82

TIME	97	98	99
9.30 - 9.45	958	798	71.3
9.45 - 10.00	967	798	70.3
10.00 - 10.15	975	797	69.9
10.15 - 10.30	980	797	69.8
10.30 - 10.45	987	797	70.0
10.45 - 11.00	989	797	70.0
11.00 - 11.15	997	798	70.0
11.15 - 11.30	1001	804	69.8
11.30 - 11.45	1004	806	69.9
11.45 - 12.00	1005	807	69.8
12.00 - 12.15	1012	811	69.7
12.15 - 12.30	1015	809	69.5
12.30 - 12.45	1024	811	69.3
12.45 - 13.00	1029	813	69.4
13.00 - 13.15	1032	813	69.4
13.15 - 13.30	1034	815	69.1
13.30 - 13.45	1032	817	69.1
13.45 - 14.00	1031	816	69.6
14.00 - 14.80	1034	817	70.0
TOTAL	19106	15321	1325.9
AVERAGE	1005	806	69.8
UNITS	F	F	F

6/17/82

TIME	6	O_2 7	8	CO 9	10	11	12	13	14	15	16	17
11.30-11.45	16.8	2.04	11.0	338	2.49	296	961	15.8	2.04	338	2.49	296
11.45-12.00	15.9	1.92	10.5	171	2.39	329	964	15.9	1.92	171	2.38	329
12.00-12.15	15.9	1.97	10.1	167	2.45	338	957	15.9	1.97	167	2.45	338
12.15-12.30	15.9	2.01	10.4	151	3.00	380	954	15.9	2.01	151	3.06	380
12.30-12.45	15.9	1.94	10.5	161	2.79	374	957	15.9	1.94	161	2.79	374
12.45-13.00	15.3	1.99	10.7	132	2.72	366	929	14.5	3.17	132	2.72	347
13.00-13.15	15.7	2.20	10.9	182	3.51	339	945	15.7	2.20	182	3.51	339
13.15-13.30	15.5	2.25	10.4	242	3.50	321	890	9.48	1.99	307	3.86	306
13.30-13.45	* 15.6	* 1.86	* 8.50	* 3545	* 2.82	* 321	* —	* 15.6	* 1.86	* 701	* 2.82	* 321
13.45-14.00	15.6	2.12	8.86	201	2.29	327	910	15.6	2.12	201	2.29	327
14.00-14.15	15.8	1.99	9.30	213	2.31	322	918	15.8	1.99	213	2.31	322
14.15-14.30	15.7	1.94	9.62	204	3.21	255	923	15.7	1.94	204	3.21	255
14.30-14.45	15.6	2.12	9.96	174	4.20	266	914	15.6	2.12	174	4.20	266
14.45-16.00	15.1	2.68	10.2	258	5.03	437	881	15.1	2.68	258	14.2	437
1500-16.15	BOILER	DOWN										
16.15-16.30	15.8	1.93	9.34	265	2.31	293	931	15.8	1.93	297	2.31	293
16.30-16.45	15.8	2.07	8.60	241	2.29	293	928	15.8	2.07	241	2.29	293
16.45-17.00	15.7	2.07	7.99	194	2.21	301	924	15.7	2.07	194	2.21	301
TOTAL	251	33.24	158.37	3294	46.70	5237	14886	244.18	34.16	3391	56.22	5203
AVERAGE	15.7	2.08	9.90	2059	2.92	.327	930	15.26	2.14	212	3.51	325
UNITS	%	%	%	PPM	PPM	PPM	PPM	%	%	PPM	PPM	PPM

* Calibration data not reliable not included in average

6/17/82

TIME	19	22	23	24	25	29	30	31	32	33	34	35
11.30 - 11.45	54.3	14.2	0.470	190	210	190	54.3	4.52	-111	-111	8.10	105
11.45 - 12.00	54.4	14.2	0.507	190	210	190	54.4	4.58	-111	-111	8.17	106
12.00 - 12.15	54.6	14.2	0.435	189	209	189	54.6	4.56	-111	-111	8.35	106
12.15 - 12.30	54.6	14.1	0.443	189	209	189	54.6	4.63	-111	-111	8.40	107
12.30 - 12.45	54.7	14.1	0.476	189	209	189	54.7	4.57	-111	-111	8.49	107
12.45 - 13.00	54.4	14.1	0.496	190	209	190	54.4	4.58	-111	-111	8.59	108
13.00 - 13.15	54.3	14.2	0.464	189	209	189	54.3	4.55	-111	-111	8.50	111
13.15 - 13.30	54.3	14.2	0.430	189	209	189	54.3	4.55	-111	-111	8.20	110
13.30 - 13.45	54.2	14.2	0.481	190	209	190	54.2	4.54	-111	-111	8.23	109
13.45 - 14.00	54.3	14.2	0.513	189	209	189	54.3	4.51	-111	-111	8.41	109
14.00 - 14.15	54.2	14.1	0.468	189	208	189	54.2	4.56	-111	-111	8.10	109
14.15 - 14.30	54.2	14.1	0.480	189	208	189	54.2	4.58	-111	-111	8.11	109
14.30 - 14.45	53.9	14.1	0.471	189	209	189	53.9	4.51	-111	-111	8.21	110
14.45 - 15.00	52.1	14.1	0.439	189	208	189	52.1	4.39	-111	-111	7.30	105
15.00 - 16.15	BOILER	DOWN										
16.15 - 16.30	55.0	14.1	0.456	190	209	190	55.0	4.66	-111	-111	8.60	102
16.30 - 16.45	54.3	14.2	0.461	189	209	189	54.3	4.38	-111	-111	8.58	105
16.45 - 17.00	53.9	14.2	0.500	190	208	190	53.9	4.30	-111	-111	8.42	104
TOTAL	921.7	240.6	8.0	3219	3551	3219	921.70	76.97	-1887	-1887	140.76	1822
AVERAGE	54.2	14.1	0.470	189	209	189	54.2	4.53	-111	-111	8.28	107
UNITS	LB/MIN	PSIA	IN H_2O	PSIA	PSIA	PSIA	PSIA	IN H_2O	PSIA	PSIA	IN H_2O	PSIA

6/17/82

TIME	36	37	38	39	40	41	42	43	44	45	46	47
11.30 - 11.45	116	116	96.8	24.8	8.10	3.01	9.02	0.623	94.3	61.1	0.393	107
11.45 - 12.00	117	115	96.8	24.8	8.17	3.02	9.02	0.782	95.7	61.9	0.405	33.6
12.00 - 12.15	118	115	96.7	24.8	8.35	3.02	9.03	0.782	96.1	62.2	0.414	115
12.15 - 12.30	118	115	96.3	24.7	8.40	3.03	9.04	0.696	96.3	62.2	0.402	135
12.30 - 12.45	118	115	96.3	24.7	8.49	3.03	9.03	0.733	96.6	62.4	0.399	143
12.45 - 13.00	119	115	96.3	24.7	8.59	3.04	9.03	0.843	96.5	62.7	0.410	149
13.00 - 13.15	122	111	93.0	24.7	8.50	3.02	9.04	0.831	94.4	61.8	0.407	146
13.15 - 13.30	121	109	91.6	24.7	8.20	3.01	9.03	0.562	93.8	60.9	0.381	438
13.30 - 13.45	120	109	91.5	24.8	8.23	3.02	9.03	0.806	93.9	60.8	0.386	28.6
13.45 - 14.00	120	109	91.4	24.7	8.41	3.02	9.03	1.31	94.6	61.2	0.406	138
1400 - 14.15	120	109	91.4	24.7	8.10	3.03	9.03	0.686	93.9	60.9	0.394	145
14.15 - 14.30	120	109	91.6	24.7	8.11	3.03	9.04	1.20	94.5	61.0	0.399	148
14.30 - 14.45	121	109	90.9	24.7	8.21	3.04	9.03	0.745	93.8	60.8	0.409	145
1445 - 15.00	116	106	88.3	24.6	7.30	3.03	9.04	1.12	80.7	55.8	0.366	146
15.00 - 16.15	BOILER	DOWN										
16.15 - 16.30	112	126	96.1	24.6	8.60	3.04	9.03	1.12	95.4	62.4	0.406	141
16.30 - 16.45	116	117	97.0	24.7	8.58	3.03	9.01	1.03	95.2	61.6	0.415	−28.3
16.45 - 17.00	114	116	96.5	24.7	8.42	3.04	9.03	0.904	93.2	60.9	0.421	112
TOTAL	2008	1921	1598.5	420.1	140.76	51.46	153.5	14.67	1598.9	1040.6	6.83	2241.9
AVERAGE	118	113	94.0	24.7	8.28	3.03	9.03	0.860	94.0	61.2	0.400	131.9
UNITS	PSIA	PSIA	PSIA	PSIA	IN H2O	PSIG	PSIG	IN H2O	IN H2O	IN H2O	IN H2O	IN H2O

6/17/82

TIME	48	49	50	51	52	53	54	55	56	57	58	59
11.30 - 11.45	-37.5	19.2	0.0147	1.18	0.615	374	409	-97.4	1588	9582	77.9	114
11.45 - 12.00	-37.5	19.2	0.0220	1.21	0.613	376	412	-97.4	1677	9976	78.7	113
12.00 - 12.15	-37.5	19.3	0.0024	1.22	0.622	379	415	-97.5	1727	9875	77.9	113
12.15 - 12.30	-37.5	19.4	0.0098	1.23	0.625	382	418	-97.4	2261	1870	76.4	115
12.30 - 12.45	-37.5	19.3	0.0024	1.23	0.620	379	416	-97.4	2675	13472	75.6	114
12.45 - 13.00	-37.5	19.3	0.0147	1.25	0.635	379	415	-97.2	2948	14684	75.1	115
1300 - 13.15	-37.5	18.7	-0.0098	1.24	0.634	378	445	-97.3	3222	15675	75.3	112
13.15 - 13.30	-37.5	18.2	0.0024	1.20	0.608	373	409	-97.4	2713	14229	76.1	114
13.30 - 13.45	-37.5	18.1	—	1.20	0.605	372	408	-97.7	235	6727	76.7	113
13.45 - 14.00	-37.5	18.2	0.0073	1.23	0.625	376	412	-97.6	734	8144	75.8	112
1400 - 14.15	-37.5	18.2	-0.0049	1.21	0.615	376	411	-97.6	1439	10497	75.8	113
14.15 - 14.30	-37.5	18.2	-0.0073	1.21	0.616	377	411	-97.4	1985	12436	75.2	115
14.30 - 14.45	-37.5	18.3	-0.0073	1.22	0.626	379	414	-97.4	2464	14020	75.1	112
14.45 - 15.00	-37.5	18.8	0.0171	1.14	0.568	376	412	-97.5	2765	15214	74.7	112
15.00 - 16.15	BOILER	DOWN										
16.15 - 16.30	-37.5	17.5	0.0122	1.06	0.657	383	419	-97.4	1725	8523	75.2	105
16.30 - 16.45	-37.5	19.2	0.0024	1.06	0.653	384	421	-97.4	977	-609	76.2	102
16.45 - 17.00	-37.5	19.4	-0.0147	1.03	0.640	383	421	-97.8	29.2	-281	73.3	99.2
TOTAL	-637.5	318.5	0.050	20.12	10.577	6426	7038	-1656.8	31164.2	173934	1291	1893.2
AVERAGE	-37.5	18.7	0.0029	1.18	0.622	378	414	-97.4	1833	10231	75.9	111
UNITS	IN H2O	IN H2O	IN H2O	IN H2O	IN H2O	F	F	F	F	F	F	F

6/17/82

* no average

TIME	60	61	62	63	64	65	66	67	68	69	70	71
11.30-11.45	131	99.5	112	111	201	96.5	71.9	326	341	348	72.7	361
11.45-12.00	131	98.5	112	112	200	216	70.3	330	345	347	74.4	365
12.00-12.15	132	99.8	112	112	201	295	69.3	330	346	349	75.3	368
12.15-12.30	136	102	113	113	206	586	68.1	333	349	353	76.1	371
12.30-12.45	134	101	112	113	205	824	67.0	334	349	353	75.6	370
12.45-13.00	135	100	110	111	206	978	66.8	335	349	352	75.4	369
13.00-13.15	134	101	110	110	205	1061	67.0	334	349	352	75.0	368
13.15-13.30	134	101	110	109	208	861	67.2	328	345	350	76.4	362
13.30-13.45	131	98.6	108	107	210	−105	69.0	328	344	346	78.4	361
13.45-14.00	130	96.5	106	107	207	3097	68.1	328	345	347	76.4	364
14.00-14.15	130	99.4	108	108	207	2981	67.5	330	344	349	75.8	365
14.15-14.30	130	98.5	108	107	209	1648	67.5	332	344	351	75.2	367
14.30-14.45	129	98.9	107	106	210	568	68.2	333	347	352	76.5	369
14.45-15.00	129	98.0	106	106	210	−186	68.1	331	347	351	79.3	364
15.00-16.15	BOILER	DOWN										
16.15-16.30	131	99.0	109	110	210	−198	68.8	335	352	352	75.2	369
16.30-16.45	134	101	110	110	214	36.9	71.1	336	354	354	78.3	372
16.45-17.00	129	97.7	105	105	207	−428	69.0	337	354	355	78.5	372
TOTAL	2239	1690.4	1868	1857	3516	*	1164.9	5640	5904	5961	1294.5	6237
AVERAGE	132	99.4	109	109	207	*	68.5	332	347	351	76.1	367
UNITS	F	F	F	F	F	F	F	F	F	F	F	F

6/17/82

TIME	72	74	75	76	77	78	79	80	81	82	83	84
11.30 - 11.45	167	365	108	176	420	97.2	123	1591	107	67.6	751	472
11.45 - 12.00	167	365	106	185	408	98.0	122	1586	110	70.1	1165	1032
12.00 - 12.15	169	366	109	183	403	96.0	127	1574	111	69.0	2138	492
12.15 - 12.30	171	367	111	183	415	99.4	128	1594	111	68.3	2613	1599
12.30 - 12.45	170	367	111	185	415	100	126	1580	110	67.0	1792	1474
12.45 - 13.00	170	368	110	187	414	101	127	1595	109	66.8	2107	1475
13.00 - 13.15	170	368	110	188	414	98.6	124	1571	108	66.7	2185	1475
13.15 - 13.30	171	368	104	189	424	99.7	120	1566	110	67.2	2063	994
13.30 - 13.45	172	368	101	190	424	98.6	119	1581	107	68.4	1364	976
13.45 - 14.00	172	366	110	189	413	98.5	116	1568	106	68.1	5183	1469
14.00 - 14.15	171	367	110	188	415	101	119	1564	108	67.5	1699	2081
14.15 - 14.30	170	369	110	188	417	99.9	119	1583	109	66.6	1923	1476
14.30 - 14.45	170	368	109	188	412	101	119	1563	109	66.5	2480	1477
14.45 - 15.00	170	369	109	188	420	100	118	1558	109	67.2	1644	1477
16.00 - 16.15	BOILER	DOWN										
16.15 - 16.30	154	367	104	187	415	101	127	1559	107	66.5	1789	1476
16.30 - 16.45	155	370	85.4	189	412	102	129	1548	111	68.5	1406	375
16.45 - 17.00	152	365	104	190	400	101	129	1543	107	68.7	1003	1496
TOTAL	2841	6243	1811.4	3168	7041	1692.9	2092	26724	1849	1150.7	33305	21316
AVERAGE	167	367	106	186	414	99.6	123	1572	109	67.7	1959	1254
UNITS	F	F	F	F	F	F	F	F	F	F	F	F

6/17/82

TIME	85	86	87	88	89	90	91	92	93	94	95	96
11.30 - 11.45	505	1981	516	211	524	201	84.5	80.2	85.1	1006	420	1006
11.45 - 12.00	493	2046	519	212	528	202	86.7	82.1	87.0	999	408	999
12.00 - 12.15	490	3250	523	212	534	202	85.9	83.4	85.9	992	403	992
12.15 - 12.30	500	3334	524	213	533	205	85.3	84.4	85.6	987	415	987
12.30 - 12.45	502	3330	523	214	532	204	85.7	84.2	86.0	985	415	985
12.45 - 13.00	501	3325	524	213	533	205	86.6	84.0	86.0	982	414	982
13.00 - 13.15	501	3315	524	213	531	200	85.7	83.9	86.2	980	414	980
13.15 - 13.30	508	3312	517	214	525	202	85.3	84.5	86.2	979	424	979
13.30 - 13.45	509	1710	518	214	523	201	87.1	85.0	86.8	979	424	979
13.45 - 14.00	498	1469	520	213	526	202	85.3	84.7	85.9	983	413	983
14.00 - 14.15	503	1473	521	214	526	205	85.0	84.4	86.1	986	415	986
14.15 - 14.30	504	1476	523	214	528	206	86.4	84.1	87.3	985	417	985
14.30 - 14.45	499	1477	524	213	531	204	86.4	83.7	86.8	985	412	985
14.45 - 15.00	506	1477	517	213	523	196	86.8	84.2	88.8	986	420	986
15.00 - 16.15	BOILER	DOWN										
16.15 - 16.30	502	3260	525	213	532	205	87.2	84.4	87.5	1083	415	1083
16.30 - 16.45	499	3057	529	215	534	207	90.0	86.3	88.0	1056	412	1056
16.45 - 17.00	487	2669	527	213	585	205	86.2	85.6	87.1	1035	400	1035
TOTAL	8507	41961	8874	3624	8998	3452	1465.1	1429.1	1472.3	16988	7041	16988
AVERAGE	500	2468	522	213	529	203	86.2	84.1	86.6	999	414	999
UNITS	F	F	F	F	F	F	F	F	F	F	F	F

6/17/82

TIME	97	98	99
11.30 - 11.45	1043	811	72.1
11.45 - 12.00	1046	807	70.8
12.00 - 12.15	1037	797	69.7
12.15 - 12.30	1030	788	68.2
12.30 - 12.45	1027	786	67.4
12.45 - 18.00	1027	786	67.2
18.00 - 13.15	1027	786	67.1
13.15 - 13.30	1034	786	67.7
13.30 - 13.45	1042	788	69.4
13.45 - 14.00	1044	790	68.5
14.00 - 14.15	1044	794	67.6
14.15 - 14.30	1047	794	67.0
14.30 - 14.45	1048	795	66.9
14.45 - 15.00	1054	790	66.8
15.00 - 16.15	BOILER	DOWN	
16.15 - 16.30	1086	803	67.0
16.30 - 16.45	1051	785	68.6
16.45 - 17.00	1029	773	69.1
TOTAL	17716	13459	1161.1
AVERAGE	1042	792	68.3
UNITS	F	F	F

SECTION 4

SAMPLING DATA SHEETS

FIELD DATA

Page 1 of 2

Plant PETC /DOE
Date 6/11/82
Sample Location Baghouse INLET
Sample Type m 5/8
Run Number 1
Operator Klug, Murtiff
Ambient Temperature 75 °F
Barometric Pressure 29.13
Static Pressure, (H_2O) − 2.5" H2O
Filter Number(s) MV-142-258

Impinger Volumes Initial	Final	Net Gain
570.0	690.0	120.0
572.8	614.4	41.6
484.7	488.4	3.7
Silica Gel		
764.7	806.5	41.8
SASS Condensate		
Total Volume		207.1

Probe Length and Type 5 ft
Nozzel Size & I.D. 0.252"
Pitot Coefficient & I.D. 0.789 P102
Assumed Moisture 9 %
Molecular Weight, Dry, (M_d) 30.36
Meter Box Number 82
Meter Coefficient 0.711 / 3.933
α Factor 1.003 / 1.034
K = 823.32
$K(Nd)^4$ = ___ x (___)^4 = 3.320
$\Delta H = K(M_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Leak Check: Initial at 15 " Hg, 0.015 CFM
Final at 20 " Hg, 0.012 CFM
Pitot Leak Check: OK

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O Desired	Actual	Temperature °F Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
	0	11:10	Init. 192.543												
6 / 23"	8	11:18	197.920	0.8	1.45	1.45	520	253			212	76	77	10	0.894
5 / 20.5"	16	11:26	203.439	0.9	1.64	1.65	515	260			300	76	76	10	0.949
4 / 16.4"	24	11:34	208.852	0.85	1.55	1.55	520	262			256	80	78	10	0.922
3 / 7.1"	32	11:42	214.352	0.60	1.10	1.10	523	260			262	83	81	8	0.775
2 / 3.5"	40	11:50	218.425	0.70	1.41	1.40	500	260			220	87	84	8	0.837
1 / 1.0"	48	11:58	222.962	0.50	1.02	1.02	500	275			220	89	86	8	0.707
	0														
6 / 23"	8		228.042	0.85	1.55	1.55	534	284			295	90	90	11	0.922
5 / 20.5"	16		233.642	0.95	1.73	1.72	539	267			265	87	88	12	0.975

WEST →

EAST →

7602/5/81/Rev 1

Comments:

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Page 2 of 2

Traverse Point Number	Sampling Time, min / Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
		Init.		Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
4 16.9"	24	238.419	0.85	1.54	1.55	539	261			272	87	87	11	0.922
	STOP AT	23:55		BOILER	CHOCKED									
AVE	71:55	45.876			1.443	521.1					83.44			.878

Run No. 2 M 5/8

Date 6/1/82

Sampling Location INLET TO BAGHOUSE

Comments:

FIELD DATA

Page 1 of 2

Plant PETC /DOE
Date 6/17/82
Sample Location 700 HP. Boiler , INLET TO BAGHOUSE
Sample Type 5/8
Run Number 2
Operator MURTIFF
Ambient Temperature 80°F
Barometric Pressure 28.92
Static Pressure, (H_2O) -3.0 IN H2O
Filter Number(s) MV-143-258

Leak Check: Initial at 20 " Hg, 0.01 CFM
Final at 20 " Hg, 0.011 CFM
Pitot Leak Check: OK

Impinger Volumes Initial	Final	Net Gain
520.0	651.2	81.2
593.5	624.0	30.5
471.1	474.8	3.7
Silica Gel		
787.4	825.5	38.1

SASS Condensate
Total Volume 153.5

Probe Length and Type 5 FT
Nozzel Size & I.D. 0.252
Pitot Coefficient & I.D. 0.789 P102
Assumed Moisture 0.09
Molecular Weight, Dry, (M_d) 30.36
Meter Box Number 82
Meter Coefficient 0.711 / 3.933
α Factor 7.003 / 1.034
K = 822.14
$K(Nd)^4$ = ___ x (___)^4 = ___ 3.315
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O Desired	Actual	Temperature °F Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
	0	12:43	Init. 249.900												
6 23"	6	12:49	253.70	0.68	1.17	1.17	520	255			258	74	74	7	0.825
5 20.5"	12	12:55	—	0.78	1.37	1.37	505	257			255	73	73	7	0.883
4 16.4"	18	13:01	261.41	0.82	1.43	1.43	506	256			252	73	73	7	6.906
3 7.1"	24	13:07	265.11	0.72	1.26	1.26	502	255			250	73	73	7	0.849
2 3.5"	30	13:13	268.49	0.60	1.05	1.05	503	254			250	74	74	7	0.775
1 1"	36	13:19	271.594	0.41	0.84	0.84	503	254			255	75	75	5	0.693
			271.594												
			LEAK CHECK	0.	01 Cf	m at	20"		Hg						

7602/5/81/Rev 1

Comments:

WEST

EAST ↓

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F					Gas Meter		Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
	0		Init. 271.801												
6 23"	6	1431	—	0.82	1.45	1.45	500	256			250	77	77	8.5	0.906
5 20.5"	12	14:37	275.75	0.85	1.50	1.50	506	255			252	78	77	8.5	0.921 0.922
4 16.9	18	14:43	279.77	0.90	1.59	1.59	503	251			248	78	77	9.0	0.949
3 7.1"	24	14:49	—	0.55	0.97	0.97	505	246			249	79	79	6.0	0.742
2 3.5"	30	14:55	287.28	0.48	0.85	0.85	503	240			252	79	78	6.0	0.693
1 1.0"	36		290.39												
			291.238												
	31.63 m		inutes	BoIler	OFF,			SPRAY NOZZle		PLUGGED					
AVE	67.63 min		41.131	[illegible]		1.225		505				75.7			.831

Run No. 2 M 5/8

Date 6/17/82

Sampling Location 700 HP Boiler
INLET TO BAGHOUSE

Comments:

FIELD DATA

Page 1 of ___

Plant PETC/DOE
Date 6-17-82
Sample Location ___
Sample Type SASS
Run Number 2
Operator P. KAUFMANN
Ambient Temperature ___
Barometric Pressure 29.00
Static Pressure, (H_2O) ___
Filter Number(s) 260, 271

Impinger Volumes

Initial	Final	Net Gain
500	512.0	12.0
500	1030.0	30.0
500		
	Silica Gel	
800.6	953.6	153.0

SASS Condensate 830.0
Total Volume 1025

Probe Length and Type 3 ft. glass
Nozzel Size & I.D. 0.559
Pitot Coefficient & I.D. ___
Assumed Moisture 10%
Molecular Weight, Dry, (M_d) 0.814
Meter Box Number 084
Meter Coefficient 3.634
α Factor 1.047
K = ___
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Leak Check: Initial at 20 " Hg, 0.03 CFM Back half
Initial ~~Final~~ at 10 " Hg, 0.035 CFM entire train
Pitot Leak Check: ___

Final leak 22 "Hg 0.029 CFM Back half
11 "Hg 0.022 CFM Entire Train

Traverse Point Number	Clock Time (24-hr) Clock	Sampling Time, min	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	1139	0	Init. 273.640												
		10	308.50	0.7		1.8	524	404	70	68	397	70	71	21/19	
stop	1159	20	337.310	0.7		1.2	527	408	70	67	401	73	72	22/20	
Start	1222	20	337.310												
		30	370.00	0.7		1.8	529	403	71	67	359	74	74	21/19	
stop	1242	40	397.103	0.7		1.0	528	406	70	67	395	77	75	22/20	
start	1315	40	397.103												
		50	429.87	0.7		1.8	519	398	69	67	365	76	76	21/19	
stop	1335	60	454.697	0.7		1.0	516	400	69	66	380	80	77	22/20	
start	1403	60	454.697												

7602/5/81/Rev 1

1159 stop to change filter

Comments: 1200 smoke reading Taken No. 8
1242 change filter - check collection in first cyclone
1335 change filter - check small cyclone

Page 2 of ___

Traverse Point Number	Sampling Time, min / Clock Time (24-hr) Clock		Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	1403	00	Init. 454.697												
		70	485.59	0.7		1.5	518	402	62	66	400	77	77	21/19	
stop	1423	80	511.567	0.7		0.8	511	402	72	63	394	81	77	22/20	
start	1612	80	511.567												
		90	545.60	0.7		1.5	533	403	71	66	400	73	73	21/19	
stop	1627	95	560.012	0.7		0.7	532	400	71	65	403	76	74	22/20	
start	1634	95	560.012												
		105	592.20	0.7		1.7	532	414	74	66	357	77	75	21/19	
stop		115	617.990	0.7		1.0	533	412	77	65	405	81	76	22/20	
						1.3									

1422 smoke Dot = #7

755

Run No. SASS #2 Date 6/17/82 Sampling Location PETC/DOE

#1423 change filter · empty small + check medium cup

Comments: 1634 change filter

1649 smoke Dot = #9

SECTION 5

ANALYTICAL RESULTS

5.1 FUEL ANALYSIS

5.2 SASS PARTICULATE EMISSIONS

5.3 EPA METHOD 5 PARTICULATE EMISSIONS

5.4 EPA METHOD 8 ANALYSES (SULFUR OXIDES)

5.5 TRACE ELEMENT ANALYSES

5.6 C_1 TO C_6 HYDROCARBONS BY GAS CHROMATOGRAPHY

    5.6.1 FROM JUNE 11, 1982

    5.6.2 FROM JUNE 17, 1982

5.7 N_2O BY GAS CHROMATOGRAPHY

5.8 TOTAL CHROMATOGRAPHABLE ORGANICS (TCO), GRAVIMETRIC ORGANICS (GRAV), IR SPECTRA, GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS), LIQUID CHROMATOGRAPHY (LC), AND LOW RESOLUTION MASS SPECTROMETRY (LRMS)

5.9 BIOASSAY REPORTS

5.1 FUEL ANALYSIS

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Department of Energy
Pittsburgh Energy Technology Center
P.O. Box 10940
Pittsburgh, Pennsylvania 15236

September 10, 1982

Mr. Robert DeRosier
Project Engineer
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Dear Mr. DeRosier:

At your request, I am sending you four copies of the laboratory analyses for the following samples:

1. Coal used during the coal-water mixture (CWM) test on June 17, 1982.
2. Fly ash (2) collected during the same test.
3. Furnace ash collected from the boiler after the test.

The CWM used on June 17 contained 59.4 percent dry coal, 0.5 percent Lomar D, and the remainder was water.

Sincerely,

Dr. Y. S. Pan
Mechanical Engineer
Combustion Technology Branch

4 Enclosures

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Department of Energy

COAL-ANALYSIS REPORT

USED ✓

LAB NO. L14787

ORGANIZATION: COMBUSTION TECHNOLOGY
SAMPLE ID: COMB #UC2-4-27-#2; 2% ASH VA.
CAN NO: -

OPR: -
STATE: - COUNTY: -
TOWN: -
MINE: -
BED: -

DATE OF SAMPLING: 4-27-82 DATE RECEIVED: 5-18-82 DATE OF REPORT: 6- 4-82
COLLECTOR: T. BROWN

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST,ASH FREE]
PROXIMATE ANALYSIS			
MOISTURE	1.92	N/A	N/A
VOLATILE MATTER	39.97	40.76	41.85
FIXED CARBON	55.54	56.62	58.15
ASH	2.57	2.62	N/A
ULTIMATE ANALYSIS			
HYDROGEN	5.70	5.60	5.75
CARBON	80.65	82.23	84.45
NITROGEN	1.57	1.60	1.65
SULFUR	1.17	1.19	1.22
OXYGEN [IND]	8.34	6.76	6.95
ASH	2.57	2.62	N/A
HEATING VALUE[BTU/LB]	14544	14829	15228

MAJOR ELEMENTS IN ASH

SILICA	38.88
AL2 O3	32.97
FE2 O3	18.79
TI O2	1.56
CA O	5.49
MG O	.48
NA2 O	1.47
K2 O	1.68
SULFITES	1.36

Department of Energy

B2UFA2 ✓
6-17-82

COAL-ANALYSIS REPORT

LAB NO. L15816

ORGANIZATION: COMBUSTION TECHNOLOGY
SAMPLE ID: COMB; #150-[illegible]-C; FLYASH 700 HP
'04
CAN NO: -

150 #2

OPR: -
STATE: - COUNTY: -
TOWN: -
MINE: -
BED: -

DATE OF SAMPLING: 6-17-82 DATE RECEIVED: 7-12-82 DATE OF REPORT: 7-14-82
COLLECTOR: T. BROWN

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST,ASH FREE]
MOISTURE	3.13	N/A	N/A
ASH	35.58	36.73	N/A
HYDROGEN	.73	.40	.63
CARBON	58.25	60.13	95.05
SULFUR	.84	.87	1.37

Department of Energy

B2UF#2 ✓
6-17-82

COAL-ANALYSIS REPORT

LAB NO. L15821

ORGANIZATION: COMBUSTION TECHNOLOGY
SAMPLE ID: COMB; #150-70-C; FLYASH 700 HP

CAN NO: -

MINE: - 150 #1
BED: -

OPR: -
STATE: - COUNTY: -
TOWN: -

DATE OF SAMPLING: 6-17-82 DATE RECEIVED: 7-12-82 DATE OF REPORT: 7-14-82
COLLECTOR: T. BROWN

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST,ASH FREE]
MOISTURE	3.27	N/A	N/A
ASH	32.92	34.03	N/A
HYDROGEN	.94	.60	.90
CARBON	60.94	63.00	95.50
SULFUR	.81	.84	1.27

Department of Energy

COAL-ANALYSIS REPORT

B2UFA2
6-17-82

LAB NO. L15825

ORGANIZATION: COMBUSTION TECHNOLOGY
SAMPLE ID: COMB; #ASH 6-22-1; FURNACE ASH 700 HP
CAN NO: -

OPR: -
MINE: -
STATE: - COUNTY: -
BED: -
TOWN: -

DATE OF SAMPLING: 6-17-82 DATE RECEIVED: 7-12-82 DATE OF REPORT: 7-15-82
COLLECTOR: T. BROWN

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST,ASH FREE]
MOISTURE	1.34	N/A	N/A
ASH	54.53	55.27	N/A
HYDROGEN	1.90	1.78	3.97
CARBON	35.23	35.71	79.84
SULFUR	2.62	2.66	5.95

COPY

LABORATORY CERTIFICATE

CURTIS & TOMPKINS, LTD.
ESTABLISHED 1878
Bulk Oil & Chemical Surveyors, Samplers & Weighers
Analytical & Consulting Chemists

SOUTHERN DIVISION
401 Canal Street
Wilmington, CA 90748
213-549-6740
TWX 910-345-6820
ANALYST WILN

290 Division Street
San Francisco, CA 94103
415-861-1863
Telex: 171042
CABLE: ANALYST SFO

FOOD TECHNOLOGISTS
ENVIRONMENTAL ANALYSTS
MEMBERS, OFFICIAL CHEMISTS
AND/OR SAMPLERS FOR GOVERNMENT
AGENCIES AND TRADE ORGANIZATIONS

Laboratory No. 82m33
Preliminary No. 0684

Reported 11/3/82
Sampled -------
Received 10/26/82

For ACUREX CORPORATION

Report on 2 samples of Compost

Mark
1) Job #307735.41, Pele/DOF Date 6-17-82, Coal Water
2) Fuel Composite 2A + 2B, A82-04-043
Subcontract No. RB59186A, Release No. 4, Purchase Order No. EM 93331A.

6-17-82
CWS fuel

	DRY BASIS 1
Carbon (C),%	75.37
Hydrogen (H),%	5.25
Oxygen (O) (by difference),%	13.49
Sulfur (S):	
First Run,%	1.20
Second Run,%	1.30
Third Run,%	1.28
Nitrogen (N):	
First Run,%	1.62
Second Run,%	1.56
Third Run,%	1.62
Specific Gravity 60°F	--
Higher Heating Value:	
BTU per Pound	14,451
Moisture (as received),%	36.45
Specific Gravity (as received)	
72°F/72°F	1.1655

Curtis & Tompkins Ltd.

SAMPLES DISCARDED 30 DAYS AFTER RECEIPT UNLESS OTHERWISE REQUESTED

5.2 SASS PARTICULATE EMISSIONS

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant PETC
Date 6-17-82
Sample Location Boiler outlet
Test No./Type 1-SASS

Performed by DeRosier

Barometric Pressure (in. Hg)	P_b	29.00
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(344.35)}{(1.041)}\right)\left(\frac{(29) + \frac{(1.3)}{13.6}}{(75.3) + 460}\right)$	$V_{m\ std}$	315.224
Volume of liquid collected (grams)	Vl_c	1025
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	48.25
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{(48.25)}{(48.25) + (315.224)}$	B_{wo}	13.3
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (15.68 x 0.44) + (2.08 x 0.32) + (82.20 + ___ x 0.28)	M_d	30.58
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (30.58)(1-.133) + 18(.133)	M_s	28.91
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}$, $(29.00) + \frac{(-3.0)}{13.6}$	P_s	28.78

Form 440 3/84

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✓

Temperature stack gas, average (^{o}F)	T_s	525
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s\ \ M_s}}$ $85.49\ (.84)(\sqrt{.831})\ \sqrt{\frac{(525) + 460}{(28.28)(28.9)}}$	$V_{s(avg)}$	62.92
Total sample time (minutes)	θ	115
Nozzle diameter, actual (inches)	N_d	0.559
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\frac{17.33\ (525 + 460)(48.25 + 315.224)}{(115)(62.92)(28.28)(.559^2)}$	%I	95.4
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(12)^2 \div 144$	A_s	3.1416
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo}) Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - .133)(62.92)(3.1416)\left(\frac{528}{525 + 460}\right)\left(\frac{28.28}{(29.92)}\right)$	Q_s	5302
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p (grams)}{Vm_{std}}$, $15.432\ \frac{60.8338}{(315.224)}$	$C_{s(std)}$	2.978
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (5302)(2.978)$	E_p	135.3

Form 440a 3/84

ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER CMEA
DATE
CUSTOMER CONTRACT NO. 307736.42
ACUREX CONTRACT NO. A82-06-026
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
PETC-DOE

SAMPLE ID (CUSTOMER)	Probe	15μ	10μ	3μ	Filter					
SAMPLE ID (LAB)										
PARAMETER										UNITS
Weight	1.1798	37.5322	3.4069	10.5965	8.1185					gram

ANALYST J. Labash
REVIEWER G. Nicoll

Form EED-057 4/80

5.3 EPA METHOD 5 PARTICULATE EMISSIONS

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ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant PETC /DOE Performed by Murtiff
Date 6-11-82
Sample Location INLET TO BAG HOUSE, 700 HP Burner
Test No./Type M 5/8, RUN #1

Barometric Pressure (in. Hg)	P_b	29.13
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(45.826)}{(1.003)}\right)\left(\frac{(29.13) + \frac{(1.443)}{13.6}}{(83.44) + 460}\right)$	V_m std	43.406
Volume of liquid collected (grams)	$V1_c$	207.1
Volume of liquid at standard condition (scf) $V1_c \times 0.04707$	V_w std	9.748
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}, \frac{(9.748)}{(9.748) + (43.406)}$	B_{wo}	18.34%
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(14 \times 0.44) + (3 \times 0.32) + (83 + — \times 0.28)$	M_d	30.36
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (___)(1-___) + 18(___)	M_s	28.09
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (in.\ H_2O)}{13.6}, (29.13) + \frac{(-2.5)}{13.6}$	P_s	28.95

7602/5/81/Rev 1

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Temperature stack gas, average (°F)	T_s	521.1
Stack velocity (fps) $85.49\,(C_p)\,(\sqrt{\Delta P_{s\ avg}})\sqrt{\frac{T_s avg + 460}{P_s\ \ M_s}}$ $85.49\,(\underline{0.789})\,(\sqrt{\overset{(0.878)}{\quad}})\sqrt{\frac{(\underline{521.1}) + 460}{(\underline{28.95})(\underline{28.09})}}$	$V_{s(avg)}$	65.05
Total sample time (minutes)	θ	71.9
Nozzle diameter, actual (inches)	N_d	0.252
Percent isokinetic (%) $\frac{17.33\,(T_s + 460)(V_w \text{ std} + V_m \text{ std})}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\frac{17.33\,(\underline{521.1} + 460)((\underline{9.748}) + (\underline{43.406}))}{(\underline{71.9})(\underline{65.05})(\underline{28.95})(\underline{0.252})^2}$	%I	105.1
Area of stack (ft²) $\pi = 3.1416$ $r = 12''$ $\pi r^2 \div 144$, $\pi(\underline{\quad})^2 \div 144$	A_s	3.1416
Stack gas volume at standard conditions (dscfm) $60\,(1 - B_{wo})Vs_{avg}\,A_s\left(\frac{528}{T_s\ avg + 460}\right)\left(\frac{Ps}{29.92}\right)$ $60\,(1 - \underline{.1884})(\underline{6505})(\underline{3.1416})\left(\frac{528}{\underline{521.1} + 460}\right)\left(\frac{(\underline{28.95})}{(29.92)}\right)$	Q_s	5213.9
Particulate matter concentration, dry (gr/dscf) $15.432\,\frac{M_p(\text{grams})}{Vm_{std}}$, $15.432\,\frac{(\underline{\quad\quad})}{(\underline{43.406})}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\,(Q_s)\,C_{s(std)}'$, $0.00857\,(\underline{5213.9})(\underline{\quad\quad})$	E_p	

7602/5/81/Rev 1

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant PETC /DOE
Performed by Murtiff
Date 6/17/82
Sample Location 700 HP Boiler, Inlet to Bag House
Test No./Type 2 M 5/8

Barometric Pressure (in. Hg)	P_b	28.92
Meter volume (std), $17.64\left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64\left(\frac{(41.131)}{(1.002)}\right)\left(\frac{(28.92) + \frac{(1.225)}{13.6}}{(75.7) + 460}\right)$	$V_{m\ std}$	39.174
Volume of liquid collected (grams)	Vl_c	153.5
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	7.225
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}, \frac{(7.225)}{(7.225) + (39.174)}$	B_{wo}	15.57%
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(14 \times 0.44) + (3 \times 0.32) + (83 + \text{—} \times 0.28)$	M_d	30.36
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo}), (30.36)(1-.1557) + 18(.1557)$	M_s	28.44
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}, (28.92) + \frac{(-3.0)}{13.6}$	P_s	28.70

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Temperature stack gas, average (^{o}F)	T_s	505
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P_{s\ avg}})\ \sqrt{\frac{T_s avg + 460}{P_s\ \ M_s}}$ $85.49\ (\underline{0.789})(\sqrt{\overset{(.831)}{\quad}})\ \sqrt{\frac{(\underline{505}) + 460}{(\underline{28.7})(\underline{28.44})}}$	$V_{s(avg)}$	60.95
Total sample time (minutes)	θ	67.63
Nozzle diameter, actual (inches)	N_d	0.252
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta\quad V_s\quad P_s\quad N_d^2}$ $\frac{17.33\ (\underline{505} + 460)((\underline{7.225}) + (\underline{39.174}))}{(\underline{67.63})(\underline{60.95})(\underline{28.70})(\underline{0.252})}$	%I	103.3
Area of stack (ft^2) $\pi = 3.1416$ $r = 12''$ $\pi r^2 \div 144,\quad \pi(\underline{\quad})^2 \div 144$	A_s	3.146
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - \underline{.1551})(\underline{60.95})(\underline{3.146})\left(\frac{528}{\underline{505} + 460}\right) \left(\frac{(\underline{28.7})}{(29.92)}\right)$	Q_s	5091.0
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}},\quad 15.432\ \frac{(\underline{\quad\quad})}{(\underline{39.174})}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)},\ 0.00857\ (\underline{\quad\quad})(\underline{\quad\quad})$	E_p	

7602/5/81/Rev 1

ACUREX
ANALYTICAL REPORT

Sample of: CMEA - PETC/DOE

Sample Date: 6/10 - 6/11/83

Requested By: L. Waterland / B. DeRosier

I.D. Number: 307735.41

Analytical Method: Gravimetric Analyses of Method 5/8 Filters & Probe Washes

Date of Analysis: 11/83

Lab I.D. Number	Component	Analytical Result	Unit
815511 TEST #1	Particulate Filter	Final wt - TARE wt = net wt 4.68148g - 1.04080g = 3.64068g	Grams particulat
815510 TEST #1	PROBE WASH (248 MLS)	68.31353g - 67.67063 g = 0.6429g LESS BLANK = 0.64283g net	GRAMS PARTICULATE
815537 TEST #2	PARTICULATE FILTER	7.73567g - 1.03915g = 6.69652g	GRAMS PARTICULATE
815538 TEST #2	PROBE WASH (295 MLS)	69.01945g - 67.67063g = 1.34882 g LESS BLANK = 1.34880g	GRAMS PARTICULATE
815501	2-propanol Blank 150 mLs	68.36830 - 68.36829 = 0.00001g	GRAMS PARTICULATE

Analysis By: Martha M. Murray

Date: 11/21/83

5.4 EPA METHOD 8 ANALYSES (SULFUR OXIDES)

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ACUREX
ANALYTICAL REPORT

Sample of: CMEA: PETC / DOE

Sample Date: 6/10 - 6/11/83

Requested By: L. Waterland / B. DeRosier

I.D. Number: 307735.41

Analytical Method: Sulfate analyses of EPA 5/8 impinger samples

Date of Analysis: 11/21/83

Lab I.D. Number	Component	Analytical Result	Unit
815504	6% H_2O_2 BLANK	0.0 INSTANT ENDPOINT	mg $SO_4^=$
815502 TEST # 1	2ND + 3RD Impingers (232 mLs)	1534.8 1540.2 AVG 1537.5	mg $SO_4^=$
815500 815503	1ST impinger Filter (247 mLs)	4.2	mg $SO_4^=$
815501 TEST # 1	80% 2-propanol Blank	0.0 INSTANT ENDPOINT	mg $SO_4^=$
815505	H_2O BLANK	0.0 INSTANT ENDPOINT	mg $SO_4^=$
815536 815539 TEST #2	1ST IMPINGER FILTER (270 mLs)	0.0	mg $SO_4^=$
815540 TEST #2	2nd + 3rD impingers (262 mLs)	3531.7	mg $SO_4^=$
815535	6% H_2O_2 BLANK	0.0	mg $SO_4^=$

** 0.009785 N $BaCl_2 \cdot 2H_2O$ used for TITRANT

Analysis By Marcia M. Murray

Date 11/21/83

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5.5 TRACE ELEMENT ANALYSIS

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COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

Date: December 3, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: 815223
PETC Fuel

IAD No.: 97-K776-116-11

REVISED

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	0.5	Terbium	0.06	Ruthenium		Vanadium	3
Thorium	0.5	Gadolinium	0.2	Molybdenum	1	Titanium	63
Bismuth	0.03	Europium	0.07	Niobium	0.5	Scandium	0.3
Lead	2	Samarium	0.3	Zirconium	2	Calcium	MC
Thallium	0.2	Neodymium	0.6	Yttrium	4	Potassium	MC
Mercury	NR	Praseodymium	0.3	Strontium	34	Chlorine	3
Gold		Cerium	1	Rubidium	0.2	Sulfur	MC
Platinum		Lanthanum	2	Bromine	1	Phosphorus	37
Iridium		Barium	25	Selenium	0.3	Silicon	MC
Osmium		Cesium	0.2	Arsenic	1	Aluminum	>53
Rhenium		Iodine	0.2	Germanium	0.5	Magnesium	MC
Tungsten	0.1	Tellurium	0.2	Gallium	2	Sodium	>14
Tantalum	0.1	Antimony	0.4	Zinc	2	Fluorine	≅5
Hafnium	≤0.3	Tin	0.04	Copper	3	Oxygen	NR
Lutetium	0.01	Indium	STD	Nickel	2	Nitrogen	NR
Ytterbium	0.1	Cadmium	≤0.04	Cobalt	1	Carbon	NR
Thulium	≤0.02	Silver	0.2	Iron	MC	Boron	0.5
Erbium	0.1	Palladium		Manganese	2	Beryllium	0.4
Holmium	0.1	Rhodium		Chromium	2	Lithium	0.7
Dysprosium	0.2					Hydrogen	NR

Note: Sample thermally ashed @ 450°C
for ≅2 hrs. prior to analyses

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.01 ppm
MC — Major Component >100 ppm
INT — Interference

Approved:

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COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300

Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

Date: November 16, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: Parr Bomb Blank

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.006
Thorium		Gadolinium		Molybdenum	0.04	Titanium	0.3
Bismuth		Europium		Niobium	≤0.01	Scandium	≤0.004
Lead	≤0.02	Samarium		Zirconium	0.03	Calcium	3
Thallium		Neodymium		Yttrium	≤0.002	Potassium	0.4
Mercury	NR	Praseodymium		Strontium	0.008	Chlorine	0.8
Gold		Cerium		Rubidium	≤0.002	Sulfur	0.05
Platinum		Lanthanum		Bromine	0.03	Phosphorus	≤0.01
Iridium		Barium	0.09	Selenium		Silicon	0.5
Osmium		Cesium		Arsenic	0.003	Aluminum	0.02
Rhenium		Iodine		Germanium		Magnesium	0.1
Tungsten		Tellurium		Gallium	0.02	Sodium	0.3
Tantalum	*0.7	Antimony		Zinc	0.2	Fluorine	≈0.1
Hafnium		Tin		Copper	0.06	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.02	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	≤0.005	Carbon	NR
Thulium		Silver		Iron	0.2	Boron	0.007
Erbium		Palladium		Manganese	0.007	Beryllium	
Holmium		Rhodium		Chromium	0.01	Lithium	0.005
Dysprosium						Hydrogen	NR

* Possible contamination from the source.

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.003 μg/ml
MC — Major Component > 10 μg/ml
INT — Interference

5-32

Approved: Robert C. [illegible]
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to
INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

P. O. No.:

Date: November 16, 1982

Analyst: G. Meagher

Sample No.: A82-06-026-8
PETC XAD

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.04
Thorium		Gadolinium		Molybdenum	0.6	Titanium	0.8
Bismuth		Europium		Niobium		Scandium	0.03
Lead	0.1	Samarium		Zirconium	0.9	Calcium	18
Thallium		Neodymium	0.07	Yttrium	0.04	Potassium	8
Mercury	NR	Praseodymium	0.3	Strontium	0.3	Chlorine	4
Gold		Cerium	0.6	Rubidium	<0.01	Sulfur	6
Platinum		Lanthanum	0.9	Bromine	0.2	Phosphorus	0.5
Iridium		Barium	1	Selenium	0.06	Silicon	5
Osmium		Cesium	0.01	Arsenic	≤0.01	Aluminum	0.5
Rhenium		Iodine	0.1	Germanium		Magnesium	3
Tungsten		Tellurium		Gallium	0.3	Sodium	2
Tantalum	*1	Antimony		Zinc	1	Fluorine	≈1
Hafnium		Tin		Copper	0.4	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.6	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.05	Carbon	NR
Thulium		Silver	0.1	Iron	22	Boron	0.03
Erbium		Palladium		Manganese	0.2	Beryllium	
Holmium		Rhodium		Chromium	0.4	Lithium	0.02
Dysprosium						Hydrogen	NR

* Possible contamination from the source.

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.01 ppm
MC — Major Component > 100 ppm
INT — Interference

Approved: Robert G. Taylor
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

P. O. No.:

Date: November 16, 1982

Analyst: G. Meagher

Sample No.: A82-06-026-11
PETC XAD Blank

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	<0.01
Thorium		Gadolinium		Molybdenum	0.06	Titanium	0.2
Bismuth		Europium		Niobium	<0.01	Scandium	<0.01
Lead	0.07	Samarium		Zirconium	0.3	Calcium	17
Thallium		Neodymium		Yttrium		Potassium	2
Mercury	NR	Praseodymium		Strontium	0.4	Chlorine	1
Gold		Cerium		Rubidium	<0.01	Sulfur	2
Platinum		Lanthanum		Bromine	0.06	Phosphorus	≤0.02
Iridium		Barium	0.7	Selenium		Silicon	4
Osmium		Cesium	<0.01	Arsenic	<0.01	Aluminum	0.1
Rhenium		Iodine	<0.01	Germanium		Magnesium	0.5
Tungsten		Tellurium		Gallium	0.1	Sodium	0.9
Tantalum	*2	Antimony		Zinc	0.3	Fluorine	≈0.2
Hafnium		Tin	0.09	Copper	0.3	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.2	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	<0.01	Carbon	NR
Thulium		Silver	0.02	Iron	3	Boron	<0.01
Erbium		Palladium		Manganese	0.03	Beryllium	
Holmium		Rhodium		Chromium	0.1	Lithium	<0.01
Dysprosium						Hydrogen	NR

* Possible contamination from the source.

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.01 ppm
MC — Major Component > 100 ppm
INT — Interference

Approved: Robert G. Taylor
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

Date: November 12, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026 4+5
PETC 10+15 μm ash

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	16	Terbium	3	Ruthenium		Vanadium	180
Thorium	31	Gadolinium	5	Molybdenum	20	Titanium	MC
Bismuth		Europium	2	Niobium	19	Scandium	11
Lead	150	Samarium	17	Zirconium	230	Calcium	MC
Thallium		Neodymium	16	Yttrium	79	Potassium	MC
Mercury	NR	Praseodymium	21	Strontium	MC	Chlorine	410
Gold		Cerium	85	Rubidium	39	Sulfur	MC
Platinum		Lanthanum	75	Bromine	35	Phosphorus	MC
Iridium		Barium	MC	Selenium	15	Silicon	MC
Osmium		Cesium	3	Arsenic	30	Aluminum	MC
Rhenium		Iodine	4	Germanium	4	Magnesium	MC
Tungsten	9	Tellurium	1	Gallium	15	Sodium	MC
Tantalum	15	Antimony	11	Zinc	*88	Fluorine	≈160
Hafnium	4	Tin	1	Copper	110	Oxygen	NR
Lutetium	2	Indium	STD	Nickel	30	Nitrogen	NR
Ytterbium	6	Cadmium	6	Cobalt	14	Carbon	NR
Thulium	0.3	Silver	≤0.6	Iron	MC	Boron	8
Erbium	4	Palladium		Manganese	92	Beryllium	8
Holmium	6	Rhodium		Chromium	170	Lithium	25
Dysprosium	9					Hydrogen	NR

* Heterogeneous

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.2 ppm
MC — Major Component > 1000 ppm
INT — Interference

Approved: Robert L. Taylor
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

Date: November 16, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026 3A+B
PETC 3 μm + filter

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	8	Terbium	0.6	Ruthenium		Vanadium	400
Thorium	9	Gadolinium	2	Molybdenum	26	Titanium	MC
Bismuth	2	Europium	1	Niobium	9	Scandium	61
Lead	77	Samarium	5	Zirconium	45	Calcium	MC
Thallium	6	Neodymium	6	Yttrium	120	Potassium	MC
Mercury	NR	Praseodymium	6	Strontium	MC	Chlorine	MC
Gold		Cerium	61	Rubidium	18	Sulfur	>330
Platinum		Lanthanum	54	Bromine	30	Phosphorus	MC
Iridium		Barium	MC	Selenium	29	Silicon	MC
Osmium		Cesium	0.3	Arsenic	440	Aluminum	MC
Rhenium		Iodine	3	Germanium	53	Magnesium	MC
Tungsten	3	Tellurium	0.4	Gallium	430	Sodium	MC
Tantalum	4	Antimony	18	Zinc	73	Fluorine	≃180
Hafnium	0.8	Tin	6	Copper	710	Oxygen	NR
Lutetium	0.6	Indium	STD	Nickel	480	Nitrogen	NR
Ytterbium	3	Cadmium	3	Cobalt	270	Carbon	NR
Thulium	0.4	Silver	4	Iron	MC	Boron	120
Erbium	1	Palladium		Manganese	>530	Beryllium	4
Holmium	2	Rhodium		Chromium	170	Lithium	74
Dysprosium	3					Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1 ppm
MC — Major Component > 1000 ppm
INT — Interference

Approved: Robert L. Taylor
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

Date: November 16, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: 815237
PETC Imp.1

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.02
Thorium		Gadolinium		Molybdenum	0.3	Titanium	0.1
Bismuth		Europium		Niobium	0.01	Scandium	0.04
Lead	0.02	Samarium		Zirconium		Calcium	1
Thallium		Neodymium		Yttrium	0.02	Potassium	1
Mercury	NR	Praseodymium		Strontium	0.04	Chlorine	0.04
Gold		Cerium		Rubidium	0.02	Sulfur	MC
Platinum		Lanthanum		Bromine	0.09	Phosphorus	0.2
Iridium		Barium	0.06	Selenium	0.2	Silicon	1
Osmium		Cesium		Arsenic	0.002	Aluminum	0.1
Rhenium		Iodine	0.004	Germanium	0.002	Magnesium	0.3
Tungsten		Tellurium	0.009	Gallium	0.03	Sodium	>7
Tantalum	0.02	Antimony	0.009	Zinc	0.4	Fluorine	≈1
Hafnium		Tin	0.03	Copper	0.2	Oxygen	NR
Lutetium		Indium	STD	Nickel	1	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.05	Carbon	NR
Thulium		Silver	0.01	Iron	MC	Boron	0.01
Erbium		Palladium		Manganese	0.9	Beryllium	
Holmium		Rhodium		Chromium	0.3	Lithium	0.002
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.002 μg/ml
MC — Major Component > 10 μg/ml
INT — Interference

Approved: Robert L. Taylor
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

Date: November 16, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: 815541
PETC Imp. 1 Blank

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.005
Thorium		Gadolinium		Molybdenum	0.05	Titanium	0.08
Bismuth		Europium		Niobium	0.002	Scandium	0.008
Lead	0.1	Samarium		Zirconium	0.02	Calcium	0.3
Thallium		Neodymium		Yttrium	0.001	Potassium	0.05
Mercury	NR	Praseodymium	0.002	Strontium	0.005	Chlorine	0.5
Gold		Cerium	0.003	Rubidium	<0.001	Sulfur	0.7
Platinum		Lanthanum	0.008	Bromine	0.02	Phosphorus	0.1
Iridium		Barium	0.08	Selenium	0.004	Silicon	0.5
Osmium		Cesium		Arsenic		Aluminum	0.04
Rhenium		Iodine	0.008	Germanium		Magnesium	0.3
Tungsten		Tellurium	0.009	Gallium	0.005	Sodium	0.2
Tantalum	0.3	Antimony		Zinc	0.05	Fluorine	≈0.06
Hafnium		Tin		Copper	0.02	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.01	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.002	Carbon	NR
Thulium		Silver	≤0.05	Iron	0.2	Boron	≤0.002
Erbium		Palladium		Manganese	0.002	Beryllium	
Holmium		Rhodium		Chromium	0.009	Lithium	<0.001
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.002 μg/ml
MC — Major Component > 10 μg/ml
INT — Interference

Approved: Robert C. Taylor
19 NOV 82

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300

Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

Date: November 12, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026-16
PETC Bottom Ash

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	18	Terbium	2	Ruthenium		Vanadium	MC
Thorium	22	Gadolinium	5	Molybdenum	57	Titanium	MC
Bismuth	3	Europium	1	Niobium	35	Scandium	47
Lead	MC	Samarium	9	Zirconium	130	Calcium	MC
Thallium	7	Neodymium	23	Yttrium	270	Potassium	MC
Mercury	NR	Praseodymium	11	Strontium	MC	Chlorine	110
Gold		Cerium	120	Rubidium	39	Sulfur	MC
Platinum		Lanthanum	93	Bromine	8	Phosphorus	MC
Iridium		Barium	MC	Selenium	11	Silicon	MC
Osmium		Cesium	1	Arsenic	110	Aluminum	MC
Rhenium		Iodine	4	Germanium	5	Magnesium	MC
Tungsten	9	Tellurium	1	Gallium	45	Sodium	MC
Tantalum	8	Antimony	21	Zinc	MC	Fluorine	≈71
Hafnium	5	Tin	41	Copper	270	Oxygen	NR
Lutetium	0.8	Indium	STD	Nickel	190	Nitrogen	NR
Ytterbium	4	Cadmium	9	Cobalt	21	Carbon	NR
Thulium	0.2	Silver	≤3	Iron	MC	Boron	54
Erbium	4	Palladium		Manganese	MC	Beryllium	7
Holmium	5	Rhodium		Chromium	620	Lithium	38
Dysprosium	8					Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.2 ppm
MC — Major Component > 1000 ppm
INT — Interference

Approved: Robert C. Taylor
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8

REC'D NOV 23 1982

Date: November 12, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026-17
PETC Baghouse Ash

IAD No.: 97-K776-116-11

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	19	Terbium	2	Ruthenium		Vanadium	MC
Thorium	42	Gadolinium	7	Molybdenum	28	Titanium	MC
Bismuth	0.8	Europium	4	Niobium	51	Scandium	32
Lead	450	Samarium	21	Zirconium	160	Calcium	MC
Thallium	3	Neodymium	55	Yttrium	320	Potassium	MC
Mercury	NR	Praseodymium	51	Strontium	MC	Chlorine	620
Gold		Cerium	140	Rubidium	21	Sulfur	MC
Platinum		Lanthanum	200	Bromine	85	Phosphorus	MC
Iridium		Barium	MC	Selenium	44	Silicon	MC
Osmium		Cesium	2	Arsenic	100	Aluminum	MC
Rhenium		Iodine	5	Germanium	22	Magnesium	MC
Tungsten	12	Tellurium	0.6	Gallium	160	Sodium	MC
Tantalum	*100	Antimony	13	Zinc	160	Fluorine	≈86
Hafnium	2	Tin	9	Copper	330	Oxygen	NR
Lutetium	1	Indium	STD	Nickel	60	Nitrogen	NR
Ytterbium	6	Cadmium	4	Cobalt	190	Carbon	NR
Thulium	0.3	Silver	≤2	Iron	MC	Boron	51
Erbium	3	Palladium		Manganese	500	Beryllium	16
Holmium	4	Rhodium		Chromium	230	Lithium	35
Dysprosium	6	* Heterogeneous				Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.2 ppm
MC — Major Component > 1000 ppm
INT — Interference

Approved:
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.

Reply to
Instrumental Analysis Division
490 Orchard Street
Golden, CO 80401

Phone: 303-278-9521

January 21, 1983

Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Re: IAD #97-K914-116-07
Subcontract #SW 59159A
Release #8

Analytical Report

Eleven (11) samples were received for analysis on October 28, 1982. These samples were assigned our IAD identification #97-K776-116-11 and were analyzed by spark source mass spectrometry (SSMS) for trace elements. Analytical reports were mailed on November 12, 1982.

Per the request of Mr. Larry Waterland of Acurex Corporation, elements found to be major components were to be quantified by other analytical methods. Seven (7) of the samples were relogged and reassigned our IAD identification #97-K914-116-07.

Except for Phosphorus and Sulfur, all elements were determined by flame atomic absorption/emission spectrophotometry. Phosphorus was determined colorimetrically. Sulfur was determined turbidimetrically except for sample #815223 where X-ray fluorescence spectrometry was used.

The results of these determinations are presented in Table No. I and Table No. II and are reported in weight per cent (wt.%) on an "as received" basis except as noted.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, IL 60148 AREA CODE 312 953-9300
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AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC.

Table No. I
(Concentrations in Wt%)

Parameter	A82-06-026-17 Baghouse Ash	A82-06-026-16 Bottom Ash	A82-06-026-4&5 PETC 10+15μm Ash	A82-06-026-3A&B PETC 3μm + Filter
Sodium	1.16	1.33	0.82	3.46
Magnesium	0.19	0.28	0.12	0.45
Aluminum	4.30	6.07	3.13	7.33
Silicon	6.30	10.43	6.06	12.37
Phosphorus	0.23	0.60	0.16	0.28
Sulfur	≤1	≤1	≤1	≤1
Potassium	0.25	0.50	0.21	0.45
Calcium	0.83	1.42	0.44	2.38
Titanium	≤0.5	≤0.4	≤0.4	≤0.7
Vanadium	≤0.3	≤0.3	--	--
Iron	3.61	4.35	2.41	4.05
Strontium	0.03	0.03	0.01	0.03
Barium	≤0.10	≤0.10	≤0.10	0.16
Manganese	--	0.05	--	--
Lead	--	0.52	--	--
Zinc	--	0.46	--	--

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Table No. II
(Concentrations in Wt.%)

Parameter	815223 PETC Fuel	815237 PETC Imp. 1
Sodium	0.01	--
Iron	0.07	✓ 0.003
Aluminum	1.34	--
Silicon	6.92	--
Potassium	1.03	--
Calcium	3.81	--
Nickel	--	--
Vanadium	--	--
Sulfur	0.44	--

If you have any questions concerning these results, please call.

Harold A. Connell
Harold A. Connell
Asst. Lab Supervisor

Robert L. Taylor
R. L. Taylor, Ph.D., Mngr.
Instrumental Analysis Div.
21 Jan 83

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COMMERCIAL TESTING & ENGINEERING CO.

SINCE 1908

Reply to
Instrumental Analysis Division
490 Orchard Street
Golden, CO 80401

Phone: 303-278-9521

March 31, 1983

Mr. Larry Waterland
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

RE: IAD #97-L494-116-01
Subcontract #SW59159A
Release #8

Analytical Report

One sample, originally received for analysis on October 28, 1982, was re-logged on March 16, 1983. This sample, previously assigned our IAD identification #97-K776-116-11, was re-assigned #97-L494-116-01.

Per the telephone conversation between Mr. Waterland of Acurex Corporation and Mr. Wilson of our IAD laboratory, the sample was analyzed for Chlorine.

An accurately weighed portion of the sample was fused with sodium hydroxide. The fusion melt was put in solution using sulfuric acid and then diluted to an appropriate volume using deionized water. The resulting solution was analyzed for Chlorine by selective ion electrode methodology.

The result of this determination is presented in Table No. I and is reported in micrograms per gram (μg/g) on an "as received" basis.

Table No. I
(μg/g-As Received)

Sample I.D.	Chlorine
A82-06-026-3A & B PETC 3 μm + filter	8,400 (0.84%)

If you have any questions concerning this result, please call.

Harold A. Connell
Harold A. Connell
Assistant Lab Manager

Robert L. Taylor 31 Mar 83
Robert L. Taylor, Ph.D., Mngr.
Instrumental Analysis Div.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, IL 60148 AREA CODE 312 953-9300
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ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER CMEA
DATE
CUSTOMER CONTRACT NO. 307736.42
ACUREX CONTRACT NO. A82-06-026, -10-025
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
PETC-DOE

SAMPLE ID (CUSTOMER)	Fuel	1632a** NBS Coal	15μ+10μ	3μ+Filter	XAD	Imp 1	Imp 2+3	Bottom Ash	Baghouse Ash	
SAMPLE ID (LAB)	6	12	4	1	8	15	9	16	17	
PARAMETER										UNITS
Mercury Aliquot	<0.05*	0.09*	0.23*	0.85*	<0.03*	5	<3	<2	0.55*	μg/L
Mercury Blank Aliquot	<1	<1	<1	<1	<0.03*	<3	<3	<1	<1	μg/L
Mercury	<0.05*	0.09*	9.4	16	<4	8	<3	<2	0.55*	μg/train
Arsenic Aliquot	--	--	--	--	--	--	<3	--	--	μg/L
Arsenic Blank Aliquot	--	--	--	--	--	--	<2	--	--	μg/L
Arsenic	--	--	--	--	--	--	<3	--	--	μg/train
Antimony Aliquot	--	--	--	--	--	--	<6	--	--	μg/L
Antimony Blank Aliquot	--	--	--	--	--	--	<1	--	--	μg/L
Antimony	--	--	--	--	--	--	<6	--	--	μg/train

*Units are mg/kg
**True value is 0.13 mg/kg

ANALYST J. Labash
REVIEWER G. Nicoll

Form EED-057 4/80

5.6 C_1 TO C_6 HYDROCARBONS BY GAS CHROMATOGRAPHY

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5.6.1 FROM JUNE 11, 1982

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-11-82, Time 08:34:15, Instrument ID ____________

Recorder/Printout Reference No. 1, Recorder ID ____________

Purpose of Run C_1 - C_6 CALIBRATION

Sample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID x, ECD __, FPD __, TCD __ (Current ________)

Detector Attenuation 2, Amplifier or Range 16×10^{-11}

Column: Liquid Phase ____________, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C

Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.33	1578			C_1
0.40	5736			C_2
0.63	9390			C_3
1.02	10255			C_4
1.90	18031			C_5
3.78	23312			C_6

Name of Operator Mark Chips, Date June 11 1982

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____

Injection Date 6-11-82, Time 08:51:24, Instrument ID ____
Recorder/Printout Reference No. 2, Recorder ID ____
Purpose of Run C_1 C_6 calibration repeat.

Sample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ____)
Detector Attenuation 2, Amplifier or Range 16x10-11
Column: Liquid Phase ____, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ____, Material SS
Temperature: Injector 120°C, Oven 180°C, Detector 250°C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method Direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.41	7192			C_1
0.64	9299			C_2
1.03	10211			C_3
1.91	17917			C_4
3.80	23420			C_5
7.87	29567			C_6

Name of Operator MARK CHIPS, Date JUNE 11 1982

GAS CHROMAT APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ______

Injection Date 6·11·82, Time 09:10:13, Instrument ID ______

Recorder/Printout Reference No. 3, Recorder ID ______

Purpose of Run C_1-C_6 calibration

Sample Description Cal cyl #6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 2, Amplifier or Range 6×10^{-11}

Column: Liquid Phase ______, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ______, Material SS

Temperature: Injector 120°, Oven 180°, Detector 250°

Temperature Program Isothermal

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.46	6605			C_1
0.78	9363			C_2
1.42	10239			C_3
2.74	17874			C_4
4.71	23095			C_5
7.31	30115			C_6
17.13	6343			

Name of Operator Mark Chips, Date 6-11- 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-11-82, Time 09:41:18, Instrument ID ____________
Recorder/Printout Reference No. 4, Recorder ID ____________
Purpose of Run C_1-C_6 calibration

Sample Description cal cyl #6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID ✓, ECD ___, FPD ___, TCD ___ (Current ________)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ____________, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ________, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.42	7076			C_1
0.64	9184			C_2
1.03	10107			C_3
1.92	17819			C_4
3.81	23103			C_5
7.88	30902			C_6

Name of Operator MARK CHIPS, Date June 11 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-11-82, Time 10:57:03, Instrument ID ____________

Recorder/Printout Reference No. 5, Recorder ID ____________

Purpose of Run stack gas sampling, analysis

Sample Description grab sample flue gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop

Detector Used: FID x, ECD __, FPD __, TCD __ (Current ________)

Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹

Column: Liquid Phase ____________, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C

Temperature Program Isothermal

SAMPLE RUN

Sampling Method grab sample

RT min	Area	Peak Height	Amount ( )	Component
0.36	2706			C_1
0.80	5381			C_2

Name of Operator MARK CHIPS, Date June 11 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ______

Injection Date 6-11-82, Time 11:11:36, Instrument ID ______
Recorder/Printout Reference No. 6, Recorder ID ______
Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID ✓, ECD __, FPD __, TCD __ (Current ______)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ______, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ______, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.36	2898			C_1
0.79	4050			C_2

Name of Operator MARK CHIPS, Date JUNE 11 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ________

Injection Date 6-11-82, Time 13:21:46, Instrument ID ________
Recorder/Printout Reference No. 7, Recorder ID ________
Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID ✓, ECD __, FPD __, TCD __ (Current ______)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ________, Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. ______, Material SS
Temperature: Injector 120°C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.36	1682			C_1
0.81	2799			C_2

Name of Operator MARK CHIPS, Date June 11 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETE, DOE, Location PITTSBURG, Job No. ___

Injection Date 6-11-82, Time 1336:57, Instrument ID ___
Recorder/Printout Reference No. 8, Recorder ID ___
Purpose of Run Stack gas analysis

Sample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ___)
Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
Column: Liquid Phase ___, Solid Phase Porapack Q,
Length 6', O.D. 1/8", I.D. ___, Material SS
Temperature: Injector 120 °C, Oven 180° C, Detector 250 °C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.36	1560			C_1
0.79	4808			C_2
4.28	711			C_3

Name of Operator MARK CHIPS, Date June 11 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. __________

Injection Date 6-11-82, Time 13:49:16, Instrument ID __________
Recorder/Printout Reference No. 9, Recorder ID __________
Purpose of Run stack gas analysis.

Sample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ______)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase __________, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ______, Material SS
Temperature: Injector 120°C, Oven 180 °C, Detector 250°C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method grabsample

RT (min)	Area	Peak Height	Amount ( )	Component
0.36	1554			C_1
0.79	436			C_2

Name of Operator MARK CHIPS, Date June 11 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-11-82, Time 1428:46, Instrument ID ____________

Recorder/Printout Reference No. 10, Recorder ID ____________

Purpose of Run Stack gas analysis

Sample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop

Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 2, Amplifier or Range 16×10^{-11}

Column: Liquid Phase ____________, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C

Temperature Program isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.36	1554			C_1
0.80	3683			C_2

Name of Operator MARK CHIPS, Date JUNE 11 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-11-82, Time 14:43:08, Instrument ID ________
Recorder/Printout Reference No. 11, Recorder ID ________
Purpose of Run C_1-C_6-calibration

Sample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID ✓, ECD __, FPD __, TCD __ (Current ________)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ________, Solid Phase porapark Q,
Length 6', O.D. 1/8", I.D. ________, Material SS
Temperature: Injector 120 °C, Oven 180°C, Detector 250 °C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.42	6966			C_1
0.65	9235			C_2
1.06	10258			C_3
1.96	17996			C_4
3.89	24080			C_5
8.05	29104			C_6

Name of Operator Mark Chips, Date June 11 1982

GAS CHROMAT APH OPERATING CONDITIONS AND FIELD LOG

Client PETC DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-11-82, Time 14:59:48 Instrument ID ________
Recorder/Printout Reference No. 12, Recorder ID ________
Purpose of Run C_1-C_6 CALIBRATION

Sample Description CAL CYL # B-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used LOOP
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ____________, Solid Phase PORAPACK Q.
Length 6', O.D. 1/8", I.D. ________, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method DIRECT INJECTION

RT (min)	Area	Peak Height	Amount ( )	Component
0.42	7195			C_1
0.66	9215			C_2
1.06	10477			C_3
1.96	18212			C_4
3.90	23603			C_5
8.08	29835			C_6

Name of Operator MARK CHIPS, Date JUNE 11 19 82

5.6.2 FROM JUNE 17, 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-17-82, Time 12:24:50, Instrument ID ____________

Recorder/Printout Reference No. 1, Recorder ID ____________

Purpose of Run C_1-C_6 calibration

Sample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 2, Amplifier or Range 16×10^{-11}

Column: Liquid Phase ____________, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120°, Oven 180°, Detector 250°

Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.40	7680			C_1
0.61	9503			C_2
0.99	10417			C_3
1.83	18491			C_4
3.62	23987			C_5
7.51	30131			C_6

Name of Operator MARK CHIPS, Date JUNE 17 1982

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GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Pete, Doe, Location Pittsburg, Job No. ______

Injection Date 6-17-82, Time 12:38:08, Instrument ID ______

Recorder/Printout Reference No. 2, Recorder ID ______

Purpose of Run C1-C6 calibration

Sample Description Cal gas cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 2, Amplifier or Range 16×10^{-11}

Column: Liquid Phase ______, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ______, Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250°C

Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.40	7497			C_1
0.61	9516			C_2
0.99	10769			C_3
1.83	18606			C_4
3.63	24000			C_5
7.52	29797			C_6

Name of Operator Mark Chips, Date June 17 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____

Injection Date 6-17-82, Time 12:51:09, Instrument ID ____

Recorder/Printout Reference No. 3, Recorder ID ____

Purpose of Run stack gas sampling

Sample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ____)

Detector Attenuation 2, Amplifier or Range 10×10^{-11}

Column: Liquid Phase ____, Solid Phase porapak Q,

Length 6', O.D. 1/8", I.D. ____, Material SS

Temperature: Injector 120°, Oven 180°, Detector 250°

Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab

RT min	Area	Peak Height	Amount ( )	Component
0.34	1898			C_1
0.80	2935			C_2

Name of Operator MARK CHIPS, Date June 17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETC DOE, Location PITTSBURG, Job No. ____

Injection Date 7-17-82, Time 1302:41, Instrument ID ____

Recorder/Printout Reference No. 4, Recorder ID ____

Purpose of Run stack gas sampling

Sample Description Stack gas grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop

Detector Used: FID x, ECD __, FPD __, TCD __ (Current ____)

Detector Attenuation 2, Amplifier or Range 16×10^{-11}

Column: Liquid Phase ____, Solid Phase porapak Q,

Length 6', O.D. ____, I.D. 1/8", Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.34	2082			C_1
0.80	2645			C_2

Name of Operator Mark Chips, Date 6-17 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 8-17-83, Time 1351:37, Instrument ID ____________
Recorder/Printout Reference No. 5, Recorder ID ____________
Purpose of Run Stack Gas Sampling

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ____________, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ________, Material SS
Temperature: Injector 120°, Oven 180°, Detector 250°
Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.35	2761			C_1
0.50	3924			C_2
3.10	564			C_3

Name of Operator MARK CHIPS, Date JUNE 17 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ______

Injection Date 6-17-82, Time 1403'10, Instrument ID ______
Recorder/Printout Reference No. 6, Recorder ID ______
Purpose of Run Stack gas sampling

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ______, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ______, Material CS
Temperature: Injector 120 °, Oven 180 °, Detector 250 °
Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.35	1256			C_1
0.79	3174			C_2

Name of Operator MARK CHIPS, Date June 17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ________

Injection Date 6-17-83, Time 1414:25, Instrument ID ________

Recorder/Printout Reference No. 7, Recorder ID ________

Purpose of Run C, -C6 CALIBRATION

Sample Description CAL cyl # 6-428

GC CONDITIONS

Amount Injected 2CC, Inj. Port or Sample Loop Used Loop

Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 2, Amplifier or Range 16 x 10-11

Column: Liquid Phase ________, Solid Phase porapack Q,

Length 6', O.D. 1/8, I.D. ______, Material SS

Temperature: Injector 120 °, Oven 180 °, Detector 250 °

Temperature Program ISOTHERMIC

SAMPLE RUN

Sampling Method direct injection

RT	Area	Peak Height	Amount ( )	Component
0.40	7644			C_1
0.61	9732			C_2
0.99	10872			C_3
1.83	18969			C_4
3.63	24391			C_5
7.54	30948			C_6

Name of Operator MARK CHIPS, Date June 17 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____

Injection Date 6-17-82, Time 1522:31, Instrument ID ____
Recorder/Printout Reference No. 8, Recorder ID ____
Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID 10, ECD ___, FPD ___, TCD ___ (Current ____)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ____, Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. ____, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT min	Area	Peak Height	Amount ( )	Component
0.35	1616			C_1

Name of Operator MARK CHIPS, Date June 17 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-17-82, Time 1532:59, Instrument ID __________

Recorder/Printout Reference No. 9, Recorder ID __________

Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop

Detector Used: FID ✓, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 2, Amplifier or Range 16×10^{-11}

Column: Liquid Phase ______________, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C

Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT min	Area	Peak Height	Amount ( )	Component
0.33	2337			C_1
0.80	1714			C_2

Name of Operator MARK CHIPS, Date June 17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Pete, Doe, Location Pittsburg, Job No. ________

Injection Date 6-17-82, Time 1546:30, Instrument ID ________

Recorder/Printout Reference No. 10, Recorder ID ________

Purpose of Run C_1-C_6 CALIBRATION

Sample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ✓, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 2, Amplifier or Range 16×10^{-11}

Column: Liquid Phase ________, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C

Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT	Area	Peak Height	Amount ( )	Component
0.40	7290			C_1
0.62	9486			C_2
0.99	10380			C_3
1.84	18561			C_4
3.65	25759			C_5
7.55	30900			C_6

Name of Operator Mark Chips, Date June 17 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ______

Injection Date 6-17-82, Time 1558:25, Instrument ID ______
Recorder/Printout Reference No. 11, Recorder ID ______
Purpose of Run C_1-C_6 CALIBRATION

Sample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ______)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ______, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ______, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ( )	Component
0.40	8507			C_1
0,62	10149			C_2
1,00	10681			C_3
1.84	18821			C_4
3.65	24385			C_5
7.56	30513			C_6

Name of Operator MARK CHIPS, Date JUNE 17 1982

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC/DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-17-82, Time 1703:31, Instrument ID __________
Recorder/Printout Reference No. 12, Recorder ID __________
Purpose of Run Stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ________)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase ____________, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ________, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.34	1941			C_1
0.82	57			C_2

Name of Operator MARK CHIPS, Date June 17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____

Injection Date 6-17-82, Time 1714:11, Instrument ID ____

Recorder/Printout Reference No. 13, Recorder ID ____

Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop

Detector Used: FID b, ECD ___, FPD ___, TCD ___ (Current ____)

Detector Attenuation 2, Amplifier or Range $6 x 10^{-11}$

Column: Liquid Phase ____, Solid Phase porapack Q,

Length 6', O.D. 1/8", I.D. ____, Material SS

Temperature: Injector 120°C, Oven 180 °C, Detector 250 °C

Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ( )	Component
0.34	1926			C_1
0.79	4283			C_2

Name of Operator MARK CHIPS, Date JUNE 17 19 82

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____

Injection Date 8-17-82, Time 1727:18, Instrument ID ____
Recorder/Printout Reference No. 14, Recorder ID ____
Purpose of Run C1-C6 CALIBRATION

Sample Description Cyl A 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ____)
Detector Attenuation 2, Amplifier or Range 6×10^{-11}
Column: Liquid Phase ____, Solid Phase porapack Q,
Length 6', O.D. 1/8", I.D. ____, Material SS
Temperature: Injector 120 °C, Oven 180° C, Detector 250 °C
Temperature Program iso thermal

SAMPLE RUN

Sampling Method direct injection

RT(min)	Area	Peak Height	Amount ( )	Component
0.40	8131			C1
0.62	10427			C2
1.00	12675			C3
1.84	19184			C4
3.66	24947			C5
7.58	30986			C6

Name of Operator MARK CHIPS, Date June 17 19 82

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DOE, Location PITTSBURG, Job No. ____________

Injection Date 6-17-82, Time 1737:20, Instrument ID __________

Recorder/Printout Reference No. __________, Recorder ID __________

Purpose of Run C_1-C_6 CALIBRATION

Sample Description Cal Cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop

Detector Used: FID x, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 2, Amplifier or Range 6×10^{-11}

Column: Liquid Phase ______________, Solid Phase poropack Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C

Temperature Program Isothermal

SAMPLE RUN

Sampling Method direct injection

RT Min	Area	Peak Height	Amount ( )	Component
0.40	9017			C_1
0.62	10511			C_2
1.00	11078			C_3
1.85	19160			C_4
3.66	24630			C_5
7.58	30120			C_6

Name of Operator MARK CHIPS, Date JUNE 17 1982

5.7 N_2O BY GAS CHROMATOGRAPHY

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ________

Injection Date 7/14/82, Time ________, Instrument ID ________

Recorder/Printout Reference No. 23, Recorder ID ________

Purpose of Run N_2O std

Sample Description 95 ppm N_2O

GC CONDITIONS

Amount Injected 1cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ________)

Detector Attenuation 16×10^{-11}, Amplifier or Range ________

Column: Liquid Phase ________, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ________, Material ________

Temperature: Injector 120 °C, Oven 39 °C, Detector 340 °C

Temperature Program ________

SAMPLE RUN

Sampling Method ________

RT	Area	Peak Height	Amount ( )	Component
7.55	71978			

Name of Operator Chips, Date ________ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 24, Recorder ID ______

Purpose of Run N_2O standard

Sample Description 95 ppm N_2O

GC CONDITIONS

Amount Injected 1cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16×10^{-11}, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ______

SAMPLE RUN

Sampling Method ______

RT	Area	Peak Height	Amount ( )	Component
1.84	943			
7.57	60990			

Name of Operator Chips, Date ______ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ________

Injection Date 7/14/82, Time ________, Instrument ID ________

Recorder/Printout Reference No. 25, Recorder ID ________

Purpose of Run N_2O Standard

Sample Description 95 ppm N_2O

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ________)

Detector Attenuation 16×10^{-11}, Amplifier or Range ________

Column: Liquid Phase ________, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ________, Material ________

Temperature: Injector 110 °, Oven 39 °, Detector 340 °

Temperature Program ________

SAMPLE RUN

Sampling Method ________

RT	Area	Peak Height	Amount ( )	Component
1.83	886			
7.56	67879			

Name of Operator CHIPS, Date ________ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____
Recorder/Printout Reference No. 26, Recorder ID ____
Purpose of Run N_2O Standard

Sample Description 95 ppm N_2O

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop
Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)
Detector Attenuation 16×10^{-11}, Amplifier or Range ____
Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,
Length 12' + 6', O.D. 1/8", I.D. ____, Material ____
Temperature: Injector 120°, Oven 39°, Detector 340°
Temperature Program ____

SAMPLE RUN

Sampling Method ____

RT	Area	Peak Height	Amount ( )	Component
7.56	57102			

Name of Operator CHIPS, Date ____ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____________

Injection Date 7/14/82, Time ________, Instrument ID ________

Recorder/Printout Reference No. 27, Recorder ID ________

Purpose of Run N_2O ANALYSES

Sample Description 815512 @ 1010 6/11/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ________)

Detector Attenuation 16×10^{-11}, Amplifier or Range ________

Column: Liquid Phase ____________, Solid Phase 12' Porapak R 6' Supel Q,

Length 12' + 6', O.D. 1/8", I.D. ________, Material ________

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ____________

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.83	85972			
7.56	24016		28.8	N_2O

Name of Operator CHIPS, Date ________ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____

Recorder/Printout Reference No. 28, Recorder ID ____

Purpose of Run 815512 REPEAT - OF TEST 1

Sample Description N_2O ANALYSES

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)

Detector Attenuation 16×10^{-11}, Amplifier or Range ____

Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ____, Material ____

Temperature: Injector 120 °, Oven 39 °, Detector 340 °

Temperature Program ____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	74011			
7.56	23984		28.8	N_2O

Name of Operator CHIPS, Date ____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ________

Injection Date 7/14/82, Time ________, Instrument ID ________

Recorder/Printout Reference No. 29, Recorder ID ________

Purpose of Run N2O ANALYSES

Sample Description 815514 @ 1205 6/11/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ________)

Detector Attenuation 16×10^{-11}, Amplifier or Range ________

Column: Liquid Phase ________, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ________, Material ________

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ________

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	52887			
7.58	28974		34.8	N2O

Name of Operator CHIPS, Date ________ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____

Recorder/Printout Reference No. 30, Recorder ID ____

Purpose of Run N2O ANALYSES

Sample Description 815514 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)

Detector Attenuation 16x10-11, Amplifier or Range ____

Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ____, Material ____

Temperature: Injector 170°, Oven 39°, Detector 340°

Temperature Program ____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	40239			
6.52	2746			
7.59	148680		178.4	N2O

Name of Operator CHIPS, Date ____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____

Recorder/Printout Reference No. 31, Recorder ID ____

Purpose of Run N2O ANALYSES

Sample Description 815514 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)

Detector Attenuation 16×10^{-11}, Amplifier or Range ____

Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ____, Material ____

Temperature: Injector 120 °, Oven 39 °, Detector 340 °

Temperature Program ____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	32159			
7.59	28501		34.2	N2O

Name of Operator CHIPS, Date ____ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 32, Recorder ID ______

Purpose of Run N_2O ANALYSES

Sample Description 815516 @ 1409 6/11/82

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16×10^{-11}, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ______

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	39532			
7.59	21196		25.4	N_2O

Name of Operator CHIPS, Date ______ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____

Recorder/Printout Reference No. 33, Recorder ID ____

Purpose of Run N2O ANALYSES

Sample Description 815516 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)

Detector Attenuation 16x10-11, Amplifier or Range ____

Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Supel Q,

Length 12' + 6', O.D. 1/8", I.D. ____, Material ____

Temperature: Injector 110 °, Oven 39 °, Detector 340 °

Temperature Program ____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.85	42903			
7.59	27177		32.6	N2O

Name of Operator CHIPS, Date ____ 19__

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✓

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____________

Injection Date 7/14/82, Time ________, Instrument ID ________

Recorder/Printout Reference No. 34, Recorder ID ________

Purpose of Run N_2O ANALYSES

Sample Description 815516 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ________)

Detector Attenuation 16×10^{-11}, Amplifier or Range ________

Column: Liquid Phase ____________, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ________, Material ________

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ____________

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	39584			
7.58	23624		28.4	N_2O

Name of Operator CHIPS, Date ________ 19__

✓

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____
Recorder/Printout Reference No. 35, Recorder ID ____
Purpose of Run N2O ANALYSES

Sample Description 815513 @ 11.55 6/17/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)
Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range ____
Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,
Length 12' + 6', O.D. 1/8", I.D. ____, Material ____
Temperature: Injector 120°, Oven 39°, Detector 340°
Temperature Program ____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.83	15006			
7.48	55252		66.3	N2O

Name of Operator CHIPS, Date ____ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 36, Recorder ID ______

Purpose of Run N2O ANALYSES

Sample Description 815513 REPEAT OF TEST # 2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16 x 10^-11, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Supr. Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120 °, Oven 39 °, Detector 340 °

Temperature Program ______

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.83	15045			
7.41	78040		93.7	N2O

Name of Operator CHIPS, Date ______ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ________

Injection Date 7/14/82, Time ________, Instrument ID ________

Recorder/Printout Reference No. 37, Recorder ID ________

Purpose of Run N2O ANALYSES

Sample Description 815513 REPEAT TEST # 2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ________)

Detector Attenuation 16 x 10^{-11}, Amplifier or Range ________

Column: Liquid Phase ________, Solid Phase 12' Porapak R 6' Supel Q,

Length 12' + 6', O.D. 1/8", I.D. ________, Material ________

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ________

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.82	101930			
7.35	81047		97.3	N2O

Name of Operator CHIPS, Date ________ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 38, Recorder ID ______

Purpose of Run N2O ANALYSES

Sample Description 815515 @ 1317 6/17/82

GC CONDITIONS

Amount Injected 1CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16×10^{-11}, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ______

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.82	31677			
7.31	73009		87.6	N_2O

Name of Operator CHIPS, Date ______ 19__

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 39, Recorder ID ______

Purpose of Run N2O ANALYSES

Sample Description 815515 REPEAT TEST #2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16×10⁻¹¹, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120 °, Oven 39 °, Detector 340 °

Temperature Program ______

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.82	37589			
5.58	8033			
7.29	72283		86.8	N2O

Name of Operator CHIPS, Date ______ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 40, Recorder ID ______

Purpose of Run N20 ANALYSES

Sample Description 815517 @ 1433 6/17/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16x10-11, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ______

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.83	238580			
5.61	8432			
7.35	88851		106.6	N20

Name of Operator CHIPS, Date ______ 19__

Form 435 3/84

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 41, Recorder ID ______

Purpose of Run N2O ANALYSES

Sample Description 815517 REPEAT #2

GC CONDITIONS

Amount Injected 1CC, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16x10^-11, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120 °, Oven 39 °, Detector 340 °

Temperature Program ______

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.83	278950			
5.65	9160			
7.41	91203		109.5	N2O

Name of Operator CHIPS, Date ______ 19__

Form 435 3/84

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____

Recorder/Printout Reference No. 42, Recorder ID ____

Purpose of Run N2O ANALYSES

Sample Description 815236 · @ 1628 · 6/17/82

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)

Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range ____

Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ____, Material ____

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	255590			
5.69	9597			
7.46	36812		44.2	N2O

Name of Operator CHIPS, Date ____ 19__

Form 435 3/84

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ________

Injection Date 7/14/82, Time ________, Instrument ID ________

Recorder/Printout Reference No. 43, Recorder ID ________

Purpose of Run N2O ANALYSES

Sample Description 815236 REPEAT #2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ________)

Detector Attenuation 16×10⁻¹¹, Amplifier or Range ________

Column: Liquid Phase ________, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ________, Material ________

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ________

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	286890			
5.74	11117			
7.53	37539		45.1	N2O

Name of Operator CHIPS, Date ________ 19__

Form 435 3/84

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____
Recorder/Printout Reference No. 44, Recorder ID ____
Purpose of Run N_2O STANDARD

Sample Description 95 ppm N_2O, 10.4% CO_2 in N_2

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop
Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)
Detector Attenuation 16×10⁻¹¹, Amplifier or Range ____
Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,
Length 12' + 6', O.D. 1/8", I.D. ____, Material ____
Temperature: Injector 120°, Oven 39°, Detector 340°
Temperature Program ____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ( )	Component
1.84	6547			
5.82	7043			
7.59	79597			

Name of Operator CHIPS, Date ____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 45, Recorder ID ______

Purpose of Run N2O STANDARD

Sample Description 95 ppm N2O, 10.4% CO2 in N2

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16×10⁻¹¹, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Supel Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120°, Oven 39°, Detector 340°

Temperature Program ______

SAMPLE RUN

Sampling Method ______

RT	Area	Peak Height	Amount ( )	Component
1.85	2860			
5.84	4705			
7.61	79456			

Name of Operator CHIPS, Date ______ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ____

Injection Date 7/14/82, Time ____, Instrument ID ____

Recorder/Printout Reference No. 46, Recorder ID ____

Purpose of Run N2O STANDARD

Sample Description 10ppm N2O in N2

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ____)

Detector Attenuation 16x10-11, Amplifier or Range ____

Column: Liquid Phase ____, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ____, Material ____

Temperature: Injector 120 °, Oven 39 °, Detector 340 °

Temperature Program ____

SAMPLE RUN

Sampling Method [illegible]

RT	Area	Peak Height	Amount ( )	Component
1.84	1381			
7.61	10258			

Name of Operator CHIPS, Date ____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. ______

Injection Date 7/14/82, Time ______, Instrument ID ______

Recorder/Printout Reference No. 47, Recorder ID ______

Purpose of Run N2O STANDARD

Sample Description 10 ppm N_2O

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used LOOP

Detector Used: FID ___, ECD ✓, FPD ___, TCD ___ (Current ______)

Detector Attenuation 16×10^{-11}, Amplifier or Range ______

Column: Liquid Phase ______, Solid Phase 12' Porapak R 6' Super Q,

Length 12' + 6', O.D. 1/8", I.D. ______, Material ______

Temperature: Injector 120 °, Oven 39 °, Detector 340 °

Temperature Program ______

SAMPLE RUN

Sampling Method ______

RT	Area	Peak Height	Amount ( )	Component
1.84	817			
7.58	10154			

Name of Operator CHIPS, Date ______ 19__

5.8 TOTAL CHROMATOGRAPHABLE ORGANICS (TCO), GRAVIMETRIC ORGANICS (GRAV), IR SPECTRA, GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS), LIQUID CHROMATOGRAPHY (LC), AND LOW RESOLUTION MASS SPECTROMETRY (LRMS)

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ACUREX
Corporation

Energy & Environmental Division

Acurex/ES (CMEA)
M/S 2-2260

November 15, 1982
Acurex ID#: A82-06-026, A82-10-025
Client PO#: 307736.42
Page 1 of 5

Attention: Larry Waterland

Sample: PETC SASS Train; Received 6/18/82

The above-referenced samples were analyzed by Level 1 protocol. Organic extracts were also analyzed for the semivolatile priority pollutants by gas chromatography/mass spectrometry employing a J&W SE-54 30 meter capillary column. The column was held at 30°C for 2 minutes, then ramped at 10°C per minute to 270°C. In addition to the priority pollutants, other organics including benzo(c)phenanthrene, dibenzo(c,g)carbazole, 7,12-dimethylbenzo(a) anthracene, 3-methylcholanthrene, and perylene were sought employing the computerized library search and manual interpretation. The assignment and quantitation of these organics is tentative since analytical standards of these compounds were not available for analysis. Benzo(c)phenanthrene, dibenzo(c,g)carbazole, 7,12-dimethylbenzo(a)anthracene, 3-methylcholanthrene and perylene were not detected in any of the samples at levels above 40 µg/mL of extract.

The XAD and OMC extract was concentrated to 11 ml. It would not concentrate further without loss of material. Two phases were observed at this point. For analysis, the extract was mixed by sonification.

If you have any questions, please call.

Submitted by: Greg Nicoll
Greg Nicoll
Chemist

Approved by: Viorica Lopez-Avila
Viorica Lopez-Avila, Ph.D.
Technical Director

GN/VLA/sla

ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER CMEA
DATE November 12, 1982
CUSTOMER CONTRACT NO. 307736.42
ACUREX CONTRACT NO. A82-06-026
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
PETC-DOE

SAMPLE ID (CUSTOMER)	15μ+10μ	3μ+Filter	XAD+OMC	Bottom Ash	Baghouse Ash					
SAMPLE ID (LAB)	4	1	8	16	17					
PARAMETER										UNITS
GRAV Aliquot	4	3	267	163	4					mg
GRAV Blank Aliquot	<2	<2	4	2	2					mg
GRAV	6	4	285	6,400*	<100*					mg/train
TCO Aliquot	--	--	4,800;4,100	3,900	18					ng/μL
TCO Blank Aliquot	--	--	<10	<10	<10					ng/μL
TCO	--	--	57;49	1,600*	0.72*					mg/train

*mg/kg

ANALYST J. Labash
REVIEWER G. Nicoll

Form EED-057 4/80

IR REPORT

SAMPLE: A82-06-026-4 15μ + 10μ

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT

SAMPLE: A82-06-026-1 Filter + 3μ

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT

SAMPLE: A82-06-026-16 Bottom Ash

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3400	W	O-H stretch (COOH)	Broad
2940	S	C-H Aliphatic	
2860	S	C-H Aliphatic	
1730	M	C=O (COOH)	
1610	M	C...C Aromatic	Tentative assignment
1460	M	C-H	
1380	W	C-C	
1280	W	C-O (COOH)	
820	W	Not assigned	
750	W	C-H	

IR REPORT

SAMPLE: A82-06-026-17 Baghouse Ash

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

IR REPORT

SAMPLE: A8Z-06-026-8 XAD and OMC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3600 - 3000	S	O-H stretch	Broad
1640	S	C=C*	With shoulder
1410	W	O-H bend	
1160 - 1060	M	C-O	
1000	W	Not assigned	

*Tentative assignment -- not supported by other absorbances

IR REPORT

SAMPLE: A82-06-026-2 Filter Blank

Wave Number (cm⁻¹)	Intensity	Assignment	Comments
		No peaks	

IR REPORT

SAMPLE: A82-06-026-11 XAD Blank

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

IR REPORT

SAMPLE: A82-06-026-13 Shake-Out Blank

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

IR REPORT

SAMPLE: A82-06-026-14 GRAV Blank

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

CONCENTRATION IN SAMPLE ALIQUOTS (µg/mL)

	10µ+15µ	Filter+3µ	Bottom Ash	Baghouse Ash	Filter Blank	XAD+ OMC	XAD Blank	Shakeout Blank
Priority Pollutants								
Naphthalene	5	47	104	8	*	*,*	3	*
Benzo(j+k)fluoranthenes	*	*	1	*	*	*,*	*	*
Chrysene	*	*	2	*	*	*,*	*	*
Benz(a)anthracene	*	*	1	*	*	*,*	*	*
Pyrene	*	*	5	*	*	*,*	*	*
Fluoranthene	*	*	4	*	*	*,*	*	*
Phenanthrene	*	*	28	*	*	*,*	*	*
Anthracene	*	*	3	*	*	*,*	*	*
Fluorene	*	*	5	*	*	*,*	*	*
Acenaphthene	*	*	3	*	*	*,*	*	*
Acenaphthylene	*	*	5	*	*	*,*	*	*
2,4-Dimethylphenol	<5	<5	13	<5	<5	<5,<5	<5	<5
Bis(2-ethylhexyl)phthalate	2	48	213	11	4	6,6	3	1
Butylbenzylphthalate	1	5	298	2	2	3,<1	2	*
Diethylphthalate	*	5	*	*	*	*,*	*	*
Final Volume	1 ml	1 ml	10 ml	1 ml	1 ml	11 ml	1 ml	1 ml

*Not detected, detection limit = 1 µg/mL

CONCENTRATION (μg/Train)

Compound	10μ+15μ	Filter+3μ	Bottom Ash*	Baghouse Ash*	XAD+OMC**
Naphthalene	8	69	42	0.3	<10,<10
Benzo(j+k)fluoranthenes	<2	<1	0.4	<0.04	↓ ↓
Chrysene	↓	↓	0.8	↓	↓ ↓
Benz(a)anthracene	↓	↓	0.4	↓	↓ ↓
Pyrene	↓	↓	2	↓	↓ ↓
Fluoranthene	↓	↓	2	↓	↓ ↓
Phenanthrene	↓	↓	11	↓	↓ ↓
Anthracene	↓	↓	1	↓	↓ ↓
Fluorene	↓	↓	2	↓	↓ ↓
Acenaphthene	↓	↓	1	↓	↓ ↓
Acenaphthylene	↓	↓	2	↓	↓ ↓
2,4-Dimethylphenol	<8	<7	5	<0.2	<60,<60
Bis(2-ethylhexyl)phthalate	6	69	85	0.3	70,70
Butylbenzylphthalate	3	7	120	0.08	<30,<20
Diethylphthalate	<2	7	<0.4	< 0.04	<10,<10

*Units are mg/kg

**Duplicate injections

APPROXIMATED CONCENTRATION OF TENTATIVELY IDENTIFIED COMPOUNDS (μg/Train)

from toluene ?

Sample	Compound	Concentration
10μ+15μ	Octamethylcyclotetrasiloxane	120
Filter+3μ	C_3-Alkylbenzene	88
	Trimethylbenzene	37
	C_4-Alkylbenzene	15
	Benzothiazole	73
Bottom Ash	Sulfur	100*
	4-Methyldibenzofuran	17*
	Trimethylnaphthalene (second)	33*
	Trimethylnaphthalene (first)	14*
	Dibenzofuran	13*
	Dimethylnaphthalene	29*
	Ethylnaphthalene	14*
	Methylnaphthalene (second)	48*
	Methylnaphthalene (first)	64*
Baghouse Ash	No Peaks Identified	--
XAD + OMC	Ethylbenzoic acid	520
	Benzoic acid	2,600
	Ethylbenzaldehyde	150

*Units are mg/kg

GCMS Detection Limits

	ACID COMPOUND	ng
21A	2,4,6-trichlorophenol	5
22A	p-chloro-m-cresol	5
24A	2-chlorophenol	5
31A	2,4-dichlorophenol	5
34A	2,4-dimethylphenol	5
57A	2-nitrophenol	5
58A	4-nitrophenol	20
59A	2,4-dinitrophenol	20
60A	4,6-dinitro-o-cresol	20
64A	pentachlorophenol	5
65A	phenol	1

	BASE/NEUTRAL COMPOUNDS	ng
1B	acenaphthene	1
5B	benzidine	20
8B	1,2,4-trichlorobenzene	1
9B	hexachlorobenzene	1
12B	hexachloroethane	1
18B	bis(2-chloroethyl)ether	1
20B	2-chloronaphthalene	1
25B	1,2-dichlorobenzene	1
26B	1,3-dichlorobenzene	1
27B	1,4-dichlorobenzene	1
28B	3,3'-dichlorobenzidine	5
35B	2,4-dinitrotoluene	1
36B	2,6-dinitrotoluene	1
37B	1,2-diphenylhydrazine (as azobenzene)	1
39B	fluoranthene	1
40B	4-chlorophenyl phenyl ether	1
41B	4-bromophenyl phenyl ether	1
42B	bis(2-chloroisopropyl)ether	1
43B	bis(2-chloroethoxy)methane	1
52B	hexachlorobutadiene	1
53B	hexachlorocyclopentadiene	1
54B	isophorone	1
55B	naphthalene	1
56B	nitrobenzene	1
61B	N-nitrosodimethylamine	NA
62B	N-nitrosodiphenylamine	1
63B	N-nitrosodi-n-propylamine	5
66B	bis(2-ethylhexyl)phthalate	1
67B	butylbenzyl phthalate	1
68B	di-n-butyl phthalate	1
69B	di-n-octyl phthalate	1
70B	diethyl phthalate	1
71B	dimethyl phthalate	1
72B	benzo(a)anthracene	1
73B	benzo(a)pyrene	1
74B	3,4-benzofluoranthene	1
75B	benzo(k)fluoranthene	1
76B	chrysene	1
77B	acenaphthylene	1
78B	anthracene	1
79B	benzo(ghi)perylene	5
80B	fluorene	1
81B	phenanthrene	1
82B	dibenzo(a,h)anthracene	5
83B	indeno(1,2,3-cd)pyrene	5
84B	pyrene	1

ACUREX
Corporation

Energy & Environmental Division

Acurex/ES

Attention: Larry Waterland

Reference: Samples PETC Bottom Ash and XAD Plus
OMC Extracts; Received 11/22/82

December 20, 1982
Acurex ID# A82-11-029
Client PO# 307736.42
Page 1 of 28

The above referenced samples were subjected to Level 1 liquid chromatography. The seven resulting fractions for each sample were subjected to gravimetric, TCO, and infrared analyses using Level 1 methodology. The results of these analyses are presented in the attached data forms.

The low recovery of the XAD plus OMC liquid chromatography fractions appears to be due to material being retained within the LC column.

Prepared by: Greg Nicoll
Greg Nicoll
Section Leader

Approved by: Viorica Lopez-Avila
Viorica Lopez-Avila, Ph.D.
Technical Director

GN/VLA/sla

Attachments

SAMPLE: PETC XAD & OMC A82-11-029-2 (29% of Extract)

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/dscm
Total Sample[1]	53	285	338	
Taken for LC[2]	15	83	98	
Recovered[3]	0.16	15.8	16	

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/dscm
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	<0.02	<0.02	<0.02	<0.07	0.8	<0.5	0.8	3	3	
2	<0.01	<0.01	<0.01	<0.03	0.4	<0.4	0.4	1	1	
3	<0.01	<0.01	<0.01	<0.03	0.6	<0.4	0.6	2	2	
4	0.13	<0.01	0.13	0.45	0.6	<0.4	0.6	2	2	
5	0.03	<0.01	0.03	0.10	0.4	<0.4	0.4	1	1	
6	<0.01	<0.01	<0.01	<0.03	0.6	<0.4	0.6	2	2	
7	<0.01	0.01	<0.01	<0.03	12.4	0.4	12.0	41	41	
Sum	0.16	<0.08	0.16	0.55	15.8	<2	15.4	52	52	

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample

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SAMPLE: PETC Bottom Ash A82-11-029-3 (50% of Extract of 25g)

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/dscm
Total Sample[1]	40	160	200	
Taken for LC[2]	20	80	100	
Recovered[3]	3.6	115.8	119.4	

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/dscm
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	3.3	<0.02	3.3	6.6	34.0	<0.5	34.0	68.0	74.6	
2	0.10	<0.01	0.10	0.2	23.0	<0.4	23.0	46.0	46.2	
3	0.06	<0.01	0.06	0.1	15.6	<0.4	15.6	31.2	31.3	
4	0.09	<0.01	0.09	0.2	10.4	<0.4	10.4	20.8	21.0	
5	0.09	<0.01	0.09	0.2	11.0	<0.4	11.0	22.0	22.2	
6	<0.01	<0.01	<0.01	<0.02	16.2	<0.4	16.2	32.2	32.2	
7	0.01	0.01	<0.01	<0.02	6.0	0.4	5.6	11.2	11.2	
Sum	3.6	<0.08	3.6	7.3	116.2	<2.0	115.8	231.4	238.7	

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample

IR REPORT A82-11-29-3

SAMPLE: LCF1 Bottom Ash PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2950	S	C-H Aliphatic	w/shoulder
2870	M	C-H Aliphatic	
1610	W	C=C	
1460	M	C-H Aliphatic	
1390	W	C-H Aliphatic	
880	W	C-H	
820	W	C-H	
760	W	C-H	

IR REPORT A82-11-29-3

SAMPLE: LCF2 Bottom Ash PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2950	S	C-H Aliphatic	Weak spectrum
1460	M	C-C	
880	W	C-H	
820	W	C-H	
760	M	C-H	

IR REPORT A82-11-29-3

SAMPLE: LCF3 Bottom Ash PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3550	W	O-H	
3450	W	O-H	
3060	M	C-H	
2950	S	C-H Aliphatic	Doublet w/shoulder
1610	M	C=C	
1460	S	C-H	
1380	M	C-H	
1270	W	C-O	
1200	W	C-O	
1020	W	C-O	
960	W	C-H	
880	M	C-H	
820	M	C-H	
760	M	C-H	
710	W	Not Assigned	

IR REPORT A82-11-29-3

SAMPLE: LCF4 Bottom Ash PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3420	W	O-H	Broad
2950	S	C-H Aliphatic	Doublet w/shoulder
1720	M	C=O	
1610	W	C=C	
1480	M	C-H	
1390	W	C-H	
1290	M	C-O	
1140	W	C-O	
1080	W	C-O	
1040	W	C-O	
820	W	C-H	
760	W	C-H	
710	W	Not Assigned	

IR REPORT A82-11-29-3

SAMPLE: LCF5 Bottom Ash PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3420	M	O-H (COOH)	Broad
2950	S	C-H Aliphatic	Doublet w/shoulder
1730	S	C=O (COOH)	
1610	M	C=C	
1460	M	C-H	
1380	W	C-H	
1290	M	C-O (COOH)	
1140	M	C-O	
1080	M	C-O	
1040	W	C-O	
820	W	CH	
750	W	CH	
710	W	Not Assigned	

IR REPORT A82-11-29-3

SAMPLE: LCF6 Bottom Ash PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3450	M	O-H (COOH)	Broad
2950	S	C-H Aliphatic	Doublet w/shoulder
1740	M	C=O (COOH)	
1620	M	C=C	
1460	M	C-H	
1380	M	C-H	
1270	M	C-O (COOH)	
820	W	C-H	
750	W	C-H	
710	W	C-H	

IR REPORT A82-11-29-3

SAMPLE: LCF7 Bottom Ash PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3300	W	O-H	Broad
2950	S	C-H	Doublet
1620	M	C=C	
1460	M	C-H	
1380	W	C-H	
1270	W	C-O	
750	W	C-H	

IR REPORT A82-11-29-4

Acurex E/S
A82-11-029
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SAMPLE: LCF1 XAD Blank PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

IR REPORT A82-11-29-4

SAMPLE: LCF2 XAD Blank PETC

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT A82-11-29-4

SAMPLE: LCF3 XAD Blank PETC

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT A82-11-29-4

SAMPLE: LCF4 XAD Blank PETC

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT A82-11-29-4

SAMPLE: LCF5 XAD Blank PETC

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Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

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IR REPORT A82 11-29-4

SAMPLE: LCF6 XAD Blank PETC

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT A82-11-29-4

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SAMPLE: LCF7 XAD Blank PETC

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT A82-11-29-2

SAMPLE: LCF1 XAD/OMC PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2950	S	C-H	Weak spectrum

IR REPORT A82-11-29-2

SAMPLE: LCF2 XAD/OMC PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2950	S	C-H	Weak spectrum
2810	M	C-H	

IR REPORT A82-11-29-2

SAMPLE: LCF3 XAD/OMC PETC

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

IR REPORT A82-11-29-2

SAMPLE: LCF4 XAD/OMC PETC

Wave Number (cm⁻¹)	Intensity	Assignment	Comments
		No peaks	

IR REPORT A82-11-29-2

SAMPLE: LCF5 XAD/OMC PETC

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No peaks

IR REPORT A82-11-29-2

SAMPLE: LCF6 XAD/OMC PETC

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Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

IR REPORT A82-11-29-2

SAMPLE: LCF7 XAD/OMC PETC

Wave Number (cm^{-1})	**Intensity**	**Assignment**	**Comments**
3400	S	O-H	Broad
1640	S	C=C	
1550	W	C-NO_2 (Not confirmed)	
1390	M	O-H	
1220	W	C-O	
1110	W	C-H	

ACUREX
Corporation

Energy & Environmental Division

Acurex/ES

April 11, 1983
Acurex ID#: 8301-029
Client PO#: 307736.42

Attention: L. Waterland

Sample: PETC extracts

The above referenced samples were analyzed by direct probe mass spectrometry. Searches have been made for classes of compounds according to procedures described in the "IERL-RTP Procedures Manual: Level 1 Environmental Assessment". Losses of very volatile compounds such as naphthalene are normally observed with this procedure. The following fragment ions used for the search are given below:

Compound Class	Fragment ions (m/e)
Polycyclic aromatic hydrocarbons	178,202,216,228,252,276
Aliphatic hydrocarbons	57,71
Halogenated aliphatics	49,63,79,81,93,95,107,109
Aromatic hydrocarbons	50,51,77,78,79,91
Ethers	45,59,73
Alcohols	45,59,61,73,75
Phenols	51,77,94
Nitriles	54,68,82
Phthalate esters	149,167
Amines	44,58
Ketones	51,71
N-heterocyclics	117,129,167,179
Mercaptans, sulfides	47,61,75
Benzothiophenes	57,58,59,69,70,85,97,111,125
Carboxylic acids	60,73,149
Amides	58,72,86,100

Prepared by: Susan M Kraska
Susan M. Kraska
Staff Chemist

Approved by: Viorica Lopez Avila
Viorica Lopez-Avila, Ph.D.
Technical Director

SMK/VLA/ats

485 CLYDE AVENUE, MOUNTAIN VIEW, CALIFORNIA 94042 PHONE: (415) 964-3200 TELEX: 34-6391 TWX: 910-3796593

LRMS REPORT

SAMPLE: 8301-029-1 PETC Front Half

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-2 PETC Baghouse Ash

Major Categories

Intensity	Category	MW Range
100	Alkylbenzenes	106-148
100	Halogenated aliphatics	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-3 PETC XAD + Omc

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-4 XAD + Omc LC Fractions 1 - 3

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-8 XAD + Omc LC Fractions 4-6

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-11 XAD + Omc LC Fraction 7

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-12 Bottom Ash LC Fraction 1

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-14 Bottom Ash LC Fraction 2

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 830k-029-15 Bottom Ash LC Fraction 3

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-16 Bottom Ash LC Fraction 4

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-17 Bottom Ash LC Fraction 5

Major Categories

Intensity	Category	MW Range
100	Alkylbenzenes	106-148

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-18 Bottom Ash LC Fraction 6

Major Categories

Intensity	Category	MW Range
100	Alkylbenzenes	106-148
100	Carboxylic acids	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-19 Bottom Ash LC Fraction 7

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

5.9 BIOASSAY REPORTS

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Litton **BIONETICS**
5516 Nicholson Lane, Kensington, Maryland 20895   301 881-5600 • Telex 89-8369

March 22, 1983

Mr. Chris Mann
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Re: Acurex Subcontract No. RB59178A,
Release No. 5

Dear Mr. Mann:

Enclosed are five bound, and one unbound, copies of the final reports for the one XAD resin extract and four particulate ash samples submitted for testing and evaluation in IERL-EPA Level 1 Ames/Salmonella mutagenesis and CHO cytotoxicity bioassays. All studies were conducted and evaluated under IERL/EPA Level 1 guidelines.

Sample CWM XAD + OMC (A82-11-29-2) could not be tested up to the recommended maximum applicable dose (MAD) based upon weight of organics per plate because of limited amount of test material. Testing with this sample was modified by eliminating less responsive tester strains in the Ames assay and eliminating the highest recommended dose in the CHO clonal toxicity assay.

The ranking of the five samples, the criteria used to evaluate the results, and the critical data upon which the evaluations were based are summarized in three attached tables.

If you have any questions or comments concerning the reports, please feel free to contact me at (301) 881-5600, extension 536.

Sincerely,

LITTON BIONETICS, INC.

Bob Young

Robert R. Young
Environmental Assessment Section
Department of Molecular Toxicology

RRY/mg
Enclosures: Ames and CHO 6791-6795 Reports

cc: Contracts

TABLE 1

BIOASSAY SUMMARY TABLE

Technical Directive or Project No. LBI Tier Numbers 20988 and 20993

Contract No. EPA No. 68-02-3188; Acurex Subcontract No. RB59178A, Release No. 5.

	Health Effects Tests				Ecological Effects Tests									
					Aquatic						Terrestrial			
					Fresh Water			Marine						
Sample Identification	AMES Salmonella	RAM Cytotoxicity	CHO Cytotoxicity	Rodent Toxicity	Fish	Invertebrate	Algal	Fish	Invertebrate	Algal	Plant Stress Ethylene	Root Elongation	Insect Toxicity	**Notes**
CWM XAD + OMC	L		U[a]											
(A82-11-29-2)														
CWM 10 + 15 um Ash	ND		M/L											
(A82-06-026-4 + 5)														
CWM 3 um + Filter Ash	ND		ND/L											
(A82-06-026-3 A + B)														
CWM Bottom Ash	ND		L/M											
(A82-6-26 815534)														
CWM Baghouse Ash	ND		L											
(A82-6-26 815234)														

[a] Test results could not be evaluated and ranked because of insufficient sample amount supplied. Test resulted indicate low (L) toxicity or less.

ND = No Detectable Toxicity
L = Low Toxicity
M = Moderate Toxicity
H = High Toxicity
U = Undetermined. Exact toxicity range could not be determined due to insufficient amount of sample.

LBI-0468 R 11/80

TABLE 2

DEFINITION OF TOXICITY CATEGORIES FOR HEALTH EFFECTS ASSAYS

Assay[a]	Activity Measured[b]	Sample Type[c]	MAD[d]	Units	Range of Concentration or Dosage			
					High	Moderate	Low	Not Detectable (ND)
Ames	MEC	S	5	mg/plate	<0.05	0.05-0.5	0.5-5	ND at >5
	(mutagenesis)	AL,NAL	200	µl/plate	<2	2-20	20-200	ND at >200
		E	5000	L/plate	<50	50-500	500-5000	ND at >5000
RAM	EC_{50}	S	1	mg/ml	<0.01	0.01-0.1	0.1-1	ND at >1
	(lethality)	AL	600	µl/ml	<6	6-60	60-600	ND at >600
		NAL	20	µl/ml	<0.2	0.2-2	2-20	ND at >20
		E	1000	L/ml	<10	10-100	100-1000	ND at >1000
CHO	EC_{50}	S	1	mg/ml	<0.01	0.01-0.1	0.1-1	ND at >1
	(lethality)	AL	600	µl/ml	<6	6-60	60-600	ND at >600
		NAL	20	µl/ml	<0.2	0.2-2	2-20	ND at >20
		E	1000	L/ml	<10	10-100	100-1000	ND at >1000
WAT	LD_{50}	S	5	gm/kg	<0.05	0.05-0.5	0.5-5	ND at >5
	(lethality and toxic signs)	AL,NAL	5	ml/kg	<0.05	0.05-0.5	0.5-5	ND at >5

[a] Standard test abbreviations are as follows:
Ames: Ames *Salmonella*/microsome mutagenesis assay
RAM: Rabbit alveolar macrophage cytotoxicity assay
CHO: Rodent cell clonal toxicity assay
WAT: Acute *in vivo* test in rodents (whole animal test)

[b] Standard abbreviations for measured endpoints are as follows:
MEC: Minimum effective concentration
EC_{50}: Calculated concentration expected to produce effect in 50 percent of population
LD_{50}: Calculated dose expected to kill 50 percent of population

[c] S = Solid, AL = Aqueous liquid, NAL = Nonaqueous liquid, E = Extract and/or concentrate of unknown organic content (use equivalent volume of SASS train gas)

[d] MAD = Maximum applicable dose

TABLE 3

HEALTH EFFECTS CRITICAL DATA SUMMARY FORM[a]

Contract No. EPA No. 68-02-3188 **Technical Directive or Project No.** LBI Tier No. 20988 and 20993 **Site Sampled** CWM site code.

Acurex Subcontract No. RB59178A,
Release No. 5

Sample Identification	Ames Mutagenicity [MEC][b]	CHO Clonal Toxicity [EC$_{50}$][c]	RAM Cytotoxicity [EC50][c]				Rodent Toxicity	
			Viability	Viability Index	ATP	ATP/Per 10^6 Cells	LD$_{50}$[d]	Toxic Signs[e]
CWM XAD + OMC	2300 μg[f]	>230 ug						
(A82-11-29-2)								
CWM 10 + 15 um Ash	> 10 mg	97 ug						
(A82-06-026-4 + 5)								
CWM 3 um + Filter Ash	> 10 mg	1200 ug						
(A82-06-026-3 A + B)								
CWM Bottom Ash	> 10 mg	110 ug						
(A82-6-26 815534)								
CWM Baghouse Ash)	> 10 mg	600 ug						
(A82-6-26 815234)								

[a] The assays, observed parameters and evaluation criteria are presented in IERL-RTP Procedures Manual; Level 1 Environmental Assessment Biological Tests, [EPA Contract No. 68-02-2681, Litton Bionetics, Inc., Kensington, Md.]

[b] MEC: Minimum Effective Concentration - Lowest concentration for any tester strain giving a mutagenic response.

[c] EC$_{50}$: Effective concentration that reduces the observed parameter to 50 percent of the appropriate negative control.

[d] LD$_{50}$: The dose lethal to 50 percent of treated animals.

[e] Toxic signs are identified in a numbered list in the Level 1 manual. Only the number is reported here.

[f] Concentrations are per plate for the Ames assay and per milliliter of culture medium for the CHO assay.

LBI-0798 1/81